AVIATION WEEK

A McGRAW-HILL PUBLICATION

JAN. 18, 1954

50 CENTS

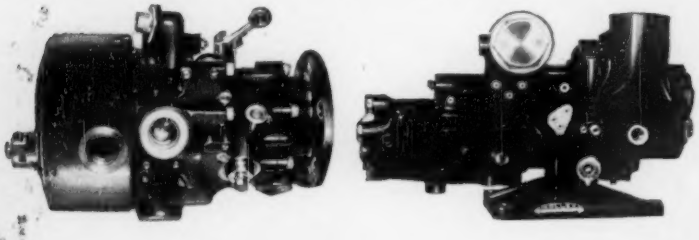
What it takes... TO BUILD THIS TEAM

Today's most powerful deterrents against aggression are the airmen and officers of the Strategic Air Command and their global B-36's. No combination of men and machines – by their mere existence – has ever been such a force for peace!

Engineering to the *Nth* power **CONVAIR** SAN DIEGO & POMONA, CALIFORNIA FORT WORTH & DAINGERFIELD, TEXAS

Within Seconds After Warning . . .

the Lockheed Starfire is in the air and on its way to altitudes of more than 45,000 feet. Holley designed and manufactured the turbine fuel control and the afterburner fuel control used on the F-94C's Pratt & Whitney Aircraft J-48 Jet Engine.

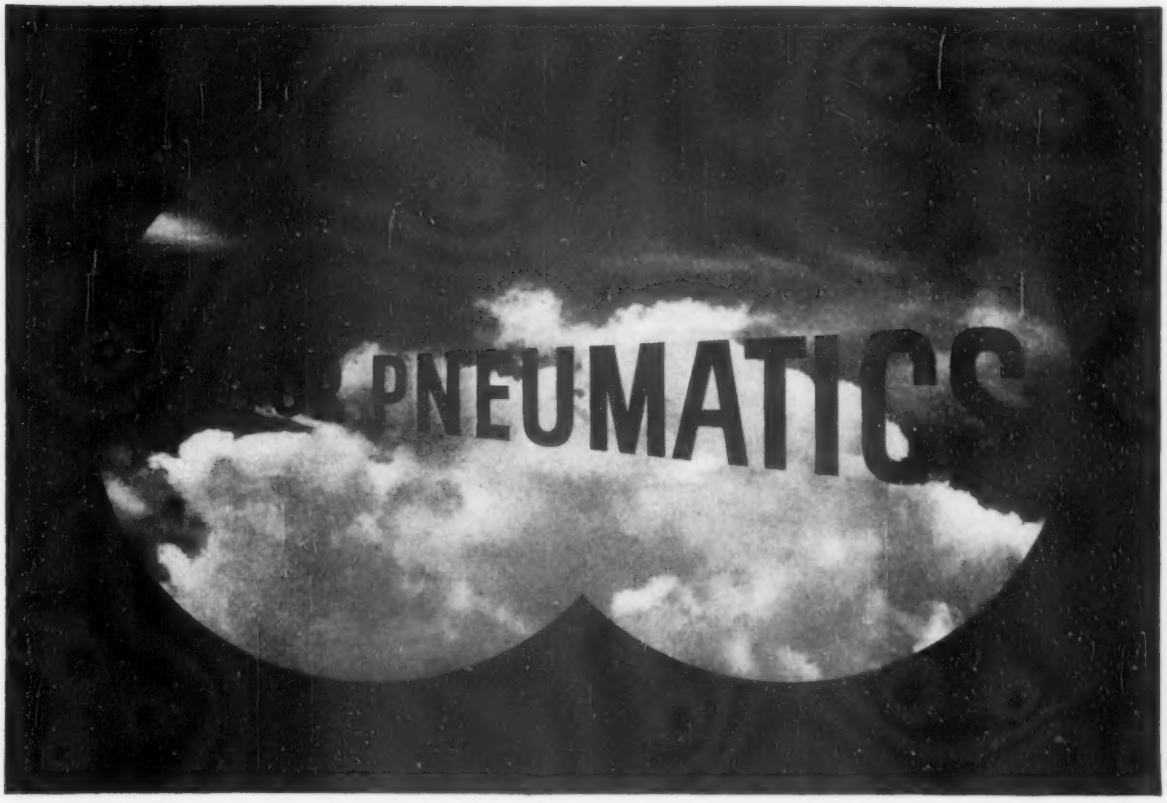


HOLLEY
Carburetor Co.

DETROIT 4, MICHIGAN

LEADER IN THE DESIGN, DEVELOPMENT AND MANUFACTURE OF AVIATION FUEL METERING DEVICES.

A-17



. . . it's headed your way.

Fighters who've been socked by Rocky Marciano have probably suspected for a long time that they've been hit by an air hammer. They've had good reason, because a recent test showed that Rocky's punch packs about a 925 foot-pound wallop. Rocky has to hit hard. But pneumatics can be gentle as a breeze or strong as a cyclone, depending on the job to be done.

Engineers all over America are keeping their eyes on new applications of an exciting force. By its earlier use in gun chargers, emergency power actuation and other utility power applications, pneumatics has shown its vast potentialities in the field of aviation. It may well be *the* actuating power of the future.

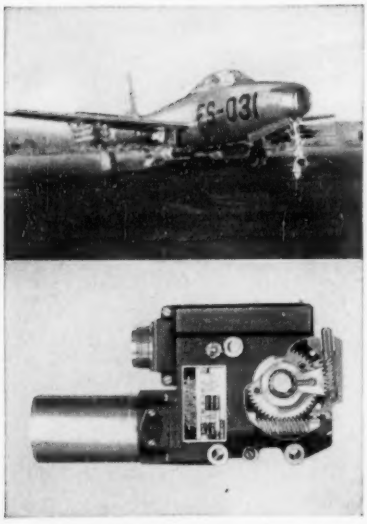
Pneumatic systems for aircraft offer tremendous advantages. They are light, simple and safe. The use of air insures an unlimited supply for the system, and eliminates the fire hazard. Pneumatic systems operate over a wide temperature range with an exceptionally high energy delivery . . . can operate huge loads quickly and easily.

We here at Kidde foresee a great future for pneumatics, and have been fortunate in being in on the ground floor of this fascinating field. Perhaps, like ourselves, you too are interested in this new application of a well-known energy source. If you have a problem in pneumatics write us.

Kidde

Walter Kidde & Company, Inc.
118 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P.Q.

Jato Release on Republic's F-84 AIRBORNE Actuated



The R-424 actuator (R-450 type) jettisons six Jato bottles after take off. The R-424 winds cables on a drum and pulls the pins.

This cutaway of Airborne's Model R-450 actuator shows the externally adjustable positive stops which, in conjunction with torque-limiting switches, provide accurate positioning at both extremes of travel. The limit may be at any value to 270°.

Projection of the splined output shaft, on both sides of the actuator, helps adapt the model R-450 to any application. The weight of this unit, with radio noise filter, is 2.7 pounds—the speed, at 26 volts and 250 pound-inch load, is 5 rpm.

See our insert in the I.A.S. Aeronautical Engineering Catalog for details on this and other Airborne actuators.

AIRBORNE

ACCESSORIES CORPORATION

1414 Chestnut Avenue Hillside 5, New Jersey

Aviation Week

January 18, 1954 Vol. 60, No. 3

Editorial Offices
New York 36—330 W. 42nd St., Tel. Longacre 4-3000
Washington 4, D. C.—National Press Bldg., Tel. National 8-3414
Los Angeles 17, Calif.—1111 Wilshire Blvd., Tel. Madison 6-4323

Table of Contents on Page 8

49,225 copies of this issue printed

Robert W. Martin, Jr. ..... *Publisher*

Robert H. Wood ..... *Editor*

Robert B. Hotz
Executive Editor

Merlin H. Mickel
Managing Editor

Albert W. Bentz ..... **News Editor**
David A. Anderton ..... **Engineering**
Irving Stone ..... **Technical**
G. L. Christian .. **Equipment, Maintenance**
Katherine Johnsen ..... **Congress**
Lee Moore ..... **Transport**
Philip Klass ..... **Avionics**
Erwin J. Bulban ..... **Special Assignments**
Richard Balentine ..... **Federal Agencies**
Frank Shea, Jr. ..... **Special Assignments**
William J. Coughlin ..... **West Coast**
Bernie Lang ..... **West Coast Assistant**
Henry Lefer ..... **News Desk**
Gordon C. Conley ..... **News Desk**
G. J. McAllister .. **Washington News Desk**
Lawrence J. Herb ..... **Art Editor**
Victoria Giaculli ..... **Editorial Makeup**
Leo T. Tarpey .... **Printing & Production**

DOMESTIC NEWS BUREAUS

Atlanta 3 .....1321 Rhodes-Haverty Bldg.
Chicago 11 .....520 No. Michigan Ave.
Cleveland 15 .....1510 Hanna Bldg.
Detroit .....856 Penobscot Bldg.
Houston 25 ..... 1303 Prudential Bldg.
Los Angeles 17 .....1111 Wilshire Blvd.
San Francisco 4 .....68 Post St.
Washington 4 ..1189 National Press Bldg.

FOREIGN NEWS SERVICE

Editor .....Joseph K. Van Denburg, Jr.
London .....Nathaniel McKitterick
Paris .....Ross Hazeltine
Frankfurt .....Gerald W. Schroder
Manila .....Herbert Leopold
Mexico City .....John Wilhelm
Sao Paulo .....Lionel J. Holmes
Tokyo .....Alpheus W. Jessup

Aviation Week is served by PRESS ASSOCIATION, INC., a subsidiary of Associated Press.

Ben Lee ..... *Industry Relations*

Research and Marketing: Catherine Miner, **Director;** Jane Grube, Jane Moffat and Mary Detwiler, **Assistants.**

J. G. Johnson ..... *Business Manager*

Sales Representatives: J. C. Anthony, **New York;** H. P. Johnson, **Cleveland;** D. T. Brennan and J. S. Costello, **Chicago and St. Louis;** E. P. Blanchard, Jr., **Boston;** James Cash, **Dallas;** Robert H. Sidur, **Atlanta;** R. E. Dorland, **San Francisco;** C. F. McReynolds, **Los Angeles;** W. S. Hessey, **Philadelphia;** C. A. Ransdell, **Detroit.** Other sales offices in **Pittsburgh, London.**

AVIATION WEEK • January 18, 1954 • Vol. 60, No. 3
Member ABP and ABC

Published weekly by McGraw-Hill Publishing Company, James H. McGraw (1860-1948), Founder. **Publication Office: 99-129 North Broadway, Albany 1, N. Y.**
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Donald C. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 North Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 36, N. Y. Allow 10 days for change of address.
Subscriptions are solicited only from persons having a commercial or professional interest in aviation. Position and company connection must be indicated on subscription orders.
Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. **Canada** $8 a year; $12 for two years; $16 for three years, payable in Canadian currency at par; other Western Hemisphere, $10 a year; $16 for two years; $20 for three years. All other countries $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A.

Copyright 1954 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Cable Address: "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

Chance Vought puts the Navy in the Air
1917–1954

The name Chance Vought—a leader in the aircraft industry since 1917—has been synonymous with Naval Aviation for decades! The Navy's first aircraft carrier was equipped with Chance Vought VE-9's; a Chance Vought airplane was the first to be accepted by the Navy for regular service aboard battleships and cruisers; and Chance Vought was the first to produce a successful float monoplane for catapult operation. Photo below shows one of the early Vought seaplanes being launched from the U. S. S. Oklahoma.

CHANCE M. VOUGHT, as one of the early Wright pilots, began flying in 1910. He was a protege of Orville Wright and is shown here in one of the earliest Wright planes, in which he learned to fly. As he pursued the field of aeronautics, Chance Vought became one of the country's top-ranking airplane designers and builders.

THE F7U-3 CUTLASS, the Navy's new swept wing jet, produced by Chance Vought, was designed as a high-performance, hard-hitting carrier-based fighter.

Petroleum research has kept pace with the pioneering of new aircraft designs. Phillips Petroleum Company, one of the nation's largest producers of aviation gasoline for both military and commercial planes, is ready with new fuels for turbo-props and jets, in addition to its tremendous capacity for producing 115/145 grade aviation gasoline.

Think first of Phillips for the finest aviation products!

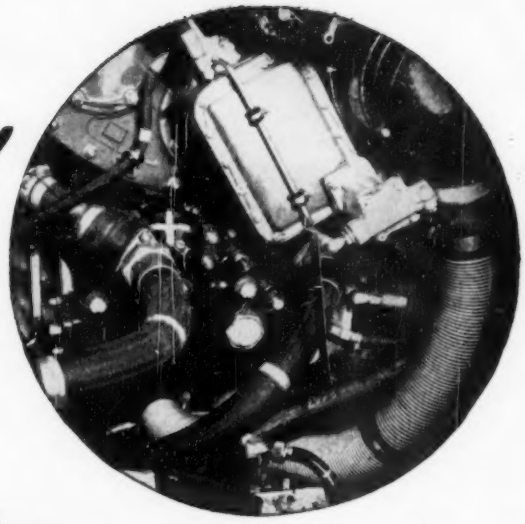
AVIATION DIVISION
PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA

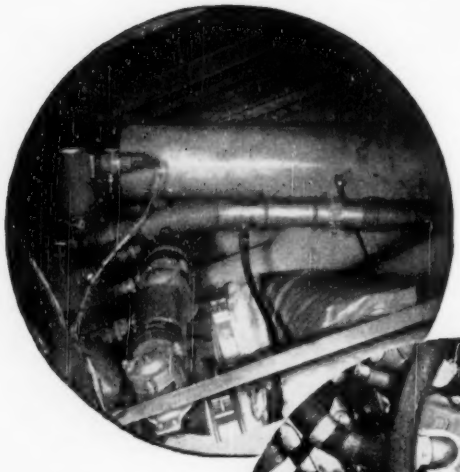
Phillips 66

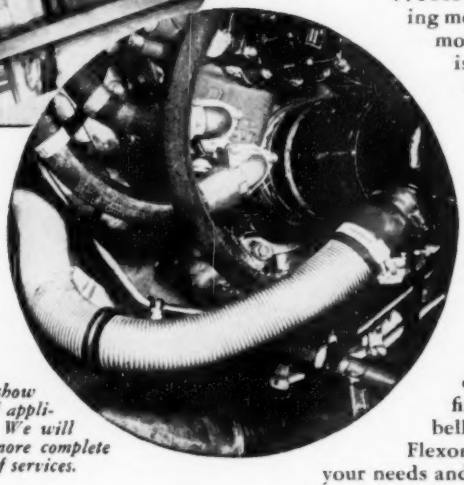
AVIATION PRODUCTS

"Thread"

YOUR WAY OUT OF MISALIGNMENT TROUBLES







The illustrations above show just a few of the scores of applications for REX-FLEX. We will be pleased to send you more complete information on all types of services.

with REX-FLEX
Flexible Metal Hose
Ducting
Flexible Connections

WITH space for aircraft "plumbing" becoming more and more limited in each succeeding model, the "threadability" of REX-FLEX is more important than ever before. This ability of REX-FLEX to be threaded through the tight spots is the result of the extreme flexibility that is engineered into all REX-FLEX flexible metal assemblies. Fabricated by advanced methods from stainless steel, REX-FLEX achieves its flexibility without sacrificing the strength and fatigue-resistant characteristics necessary in aircraft.

REX-FLEX assemblies are made to your requirements for a wide variety of services ranging from anti-icing ducting to cross ignition tubes . . . from fire-proof fuel and oil lines to tail cone bellows assemblies.

Flexonics engineers will be pleased to go over your needs and make recommendations. Write today.

Flexonics *Corporation*

AIRCRAFT DIVISION
1302 S. THIRD AVENUE • MAYWOOD, ILLINOIS

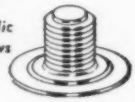
FORMERLY CHICAGO METAL HOSE CORPORATION
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.

Flexible metal hose

Expansion joints

Aircraft components


Metallic bellows

NEWS DIGEST

Domestic

FJ-4 Fury—new thin-wing "fintail" model of North American Aviation's carrier-based fighter—will be built for Navy under a contract calling for production into 1956 at NAA's Columbus plant. The improved Fury will be powered by Curtiss-Wright J65 Sapphire, is expected to fly faster than 650 mph. Schedules call for assembly of two prototypes concurrently with present FJ-3 output before work starts on an undisclosed number of production FJ-4s. Term "fintail" refers to an external spine atop fuselage from rear of cockpit to vertical fin.

Navy cutback in Chance Vought Aircraft's F7U-3 Cutlass production has forced layoff of 1,500 assembly-line workers, the scheduled dismissal of an additional 1,000 this week and 750 more by the end of this year. The Navy fighters are standing outside Vought's Dallas plant awaiting Westinghouse J46 engines, and company president Frederick O. Detweiler says no powerplants are in storage. But Westinghouse general works manager says the engines are being shipped on schedule to a Dallas warehouse.

Atomic-powered aircraft probably will fly within 25 years, Gen. James H. Doolittle predicts, and control of most military aircraft from takeoff to landing will be entirely automatic within the next 50 years.

J. L. Atwood, president of North American Aviation, is new president of the Institute of the Aeronautical Sciences, will take office Jan. 25 at IAS annual Honor's Night Dinner in New York.

Jet stream is being studied by scientists at the Air Force Cambridge (Mass.) Research Center, measuring winds, temperatures, humidity and turbulence during B-47 and B-29 flights in the air current that flows over the Northern Hemisphere at altitudes between 30,000 and 40,000 ft. and at speeds up to 300 mph.

Harold Harris is on indefinite leave of absence as president and chief executive officer of Northwest Orient Airlines because of illness. He suffered a "slight heart attack" last week. Meantime, Malcolm Mackay, vice president in charge of the Continental Division, is "acting executive officer."

Westinghouse Electric Corp. plans to complete transfer of its jet engine production facilities from Lester, Pa., to Kansas City, Mo., by the end of this year. Purpose: to consolidate engineering and manufacturing facilities in one location.

New Spray/Dust Plane Flies

First flight view of the new Central-Lamson Air Tractor agricultural biplane which started an accelerated test program Dec. 10 at Yakima, Wash. Tests have included carrying loads of 2,500 lb., during which the loaded Air Tractor took off in less than 1,000 ft. and came to a full stop in 950 ft. Powerplant is 450-hp. P&WA Wasp Jr. Interesting design features of the new plane include: gull wings having interchangeable panels, uncovered rear fuselage for easy cleaning following drop of corrosive chemicals and end plates on all four wingtips to aid flying performance.

New aviation members of Arnold Engineering Development Center's Industry and Educational Board for 1954: Edward C. Wells, Boeing Airplane Co. vice president-engineering; Paul J. Frizzell, vice president of Fairchild Engine & Airplane Corp.; R. C. Sebold, vice president-engineering for Convair; Neil Burgess, development manager of General Electric Aircraft Gas Turbine Division; L. A. Hyland, Bendix Aircraft Corp. vice president, and Ronald M. Hazen, engineering director of General Motors Allison Division.

Convair has delivered its 501st twin-engine aircraft based on the 240 and 340 design.

Capital Airlines reports 10,871 persons were flown 3.5 million passenger-miles Jan. 3, setting a new peak for the carrier. Revenue for the day: $206,944.

First military pilot to log 1,000 hr. in Boeing's B-47 Stratojet is believed to be Maj. Donald G. Prieve of the MacDill Strategic Air Command base in Florida.

Sanders Manufacturing Co., Tulsa aircraft parts producer, has been purchased by ICT Discount Corp. of Dallas for an undisclosed price.

Lt. Col. Phyllis D. S. Gray is new director of Women in the Air Force (WAF), succeeding Col. Mary Shelly, who resigned recently.

Financial

Los Angeles Airways reports net profit of $53,769 for the first nine months of 1953 from $390,628 income.

National Airlines has declared a regular 15-cent quarterly dividend on common stock, payable Apr. 15 to holders of record Apr. 5.

Northwest Orient Airlines has omitted its regular quarterly dividend on 4.6% cumulative preference stock, citing high expenses for new equipment and maintenance, loss of Pacific airlift and mail revenue as the cause.

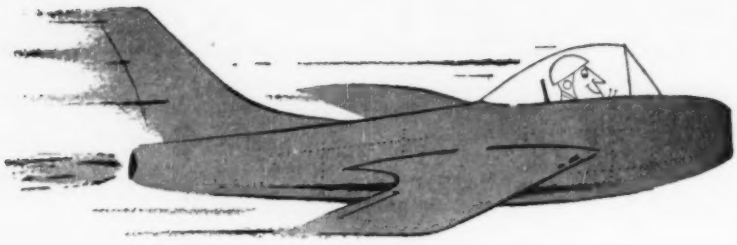
International

Avianca DC-3 crashed and burned last week between Medellin and Armenia, Colombia, killing 23 persons.

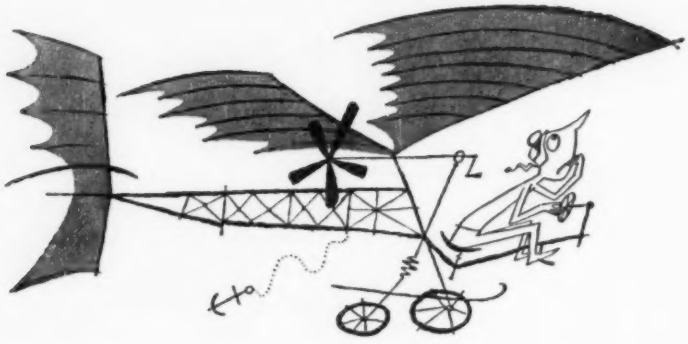
Canadian aviation industry's gross for 1953 is estimated at more than $400 million, peacetime peak and slightly below 1944 wartime high of $46 million.

De Havilland Aircraft of Canada reports net profit of $177,168 for 1953, compared with $259,620 for the previous year. Sales totaled $15 million.

Air agreement talks between Britain and Switzerland opened last week on Swissair's demand for transit rights in London for its flights to New York.



THERE'S A BIG DIFFERENCE



...in Clamps, too!

The big difference in clamps used in the fabrication of sheet metal riveted and welded sections of aircraft is *precision*. Monogram 3-H Safety Clamps are precision-made to do a precision job and offer many big advantages:

- *Needles always uniform.*
- *Needles maintain true alignment.*
- *Greater spring tension.*
- *One piece construction.*
- *Safe, will not fly apart.*
- *Sturdier, last longer.*
- *Proven in 12 years use.*

Write today for catalog on the many types and sizes of Monogram 3-H Clamps and applying tools.

MONOGRAM

MANUFACTURING COMPANY
8557 Higuera Street, Culver City, California

MONOGRAM
3H
SAFETY CLAMPS

The Aviation Week

January 18, 1954

Headline News

Congress Showdown Set on Air Issues.. 13
Hughes Charity 14
Navy Censors Air Contractors..... 15
Comet Future? 16
Britain Losing Jet Lead: Sopwith..... 17
AF Blueprints NATO Plane Output... 18
Navy Gets New Demon..... 19
ANDB to Get Policy-Level Staff..... 20
Braniff Dies in Plane Crash..... 20
Fight on Air Act..... 23
Josh Lee Blasts CAB Decision..... 24

Aeronautical Engineering

Which Wing Shape Is Best?..... 28
Space Experts Outline Targets..... 34
New Lightplanes Make Debuts..... 44

Production

Jap Team Looks for Comeback Data... 45

Avionics

Arcon Prevents Lightplane Spirals..... 51
IRE Automatic Factory Symposium.... 51

Equipment

J&H 'Demobilizes' Military Accessories 56

Financial

Presidents Join Corporate Boards..... 70
Defense Is 1/5th of GM's Business..... 73

Air Transport

Pilots May Delay Slick-Tiger Merger.. 80
Examiner Urges S&WA Certificate..... 84
Line Loses Name..... 84
Airport Aid Boosts Costs: Official.. ... 86

Editorials

Political Censorship Is Here..... 90
Thomas E. Braniff..... 90
Truth or Distortion?..... 90

Departments

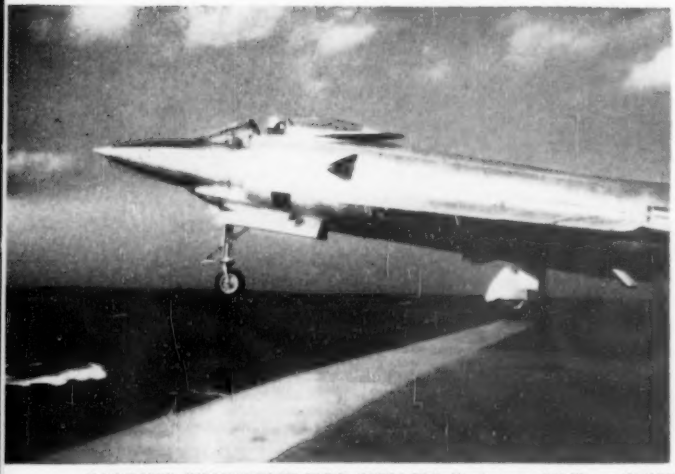
News Digest 7
Picture Page 9
Industry Observer 10
Who's Where 10
News Sidelights 23
Thrust & Drag 33
Production Briefing 48
Filter Center 52
New Aviation Products 61
Also on the Market..... 62
CAB Orders 83
Shortlines 86
Aviation Calendar 87
Feature Page 88

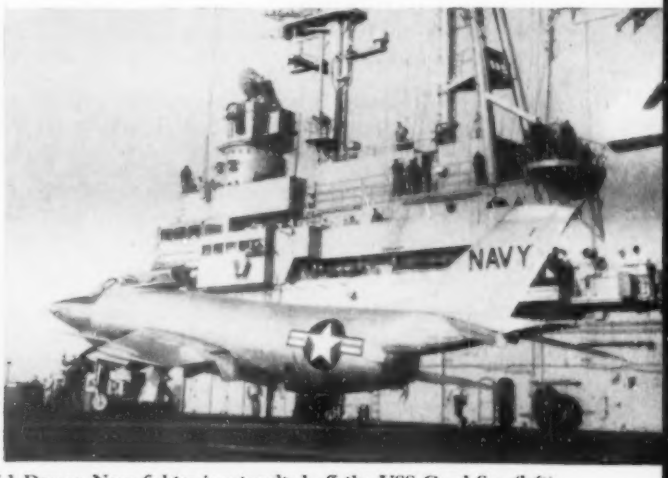
Picture Credits

9—(top) Lockheed; (bottom) USN; 19—McDonnell; 28-29—Douglas Aircraft Co., Inc.; 34—(bottom) Erwin J. Bulban; 44—(top three) Howard Levy; (next to last) Burton Kemp; 88—Engineering News-Record.

STARFIRE ON THE PROWL—First flight view of Lockheed F-94C Starfire all-weather fighter carrying auxiliary air-to-air wing-mounted rocket pods which boost the all-rocket-armed plane's total to 48 missiles. Avionics devices aim and fire the rockets.

New U.S. Military Jets Go Aloft





CARRIER WORKOUT FOR DEMON—Prototype McDonnell XF3H-1 Demon Navy fighter is catapulted off the USS Coral Sea (left) after being taxied (right) to launching position during course of carrier trials in the Atlantic. Noteworthy in takeoff closeup is plane's extended full-span leading edge slats, also open flush air intake behind cockpit. Primary air intakes for Westinghouse J40 are on each side of cockpit. Rear view of Demon points up movable horizontal stabilizer. Story and pictures of first production Demon are on p. 19.

INDUSTRY OBSERVER

►Martin has modified a Matador zero-launcher for the Republic F-84. Feeling is that this system of takeoff, together with use of a rubber mat for landing, is going to have considerable promise for military use. Air Force definitely is in the picture.

►Rolls-Royce new turboprop will start off at 2,500 eshp. instead of the projected 4,000 eshp. Rolls figures it wiser to start off below designed stress while bugs are being worked out.

►English Electric's all-weather delta fighter, designated the F-23, is being groomed to take top honors at Farnborough this year. It will appear with Armstrong Siddeley Sapphires.

►One possible and important use of the B-36-F-84 parasite fighter combination, in addition to its atomic bomb potential, is employment of the same team in an early warning radar system. The fighter could check and if necessary attack targets picked up on B-36 early warning radar.

►Reason given for Navy cancelation of the production contract for most of the Convair F2Ys is difficulties encountered with Westinghouse J34 engines which powered the unusual water-based fighter. Limited production order was for slightly more than a dozen of the new planes, including prototypes. Convair now is in the process of negotiating a new contract for a single-engine configuration of the design, with a different engine, according to a Navy source.

►Air Force officers who have flown Navy's Douglas F4D Skyray are reported to have been impressed with its high-altitude performance. One industry source says AF officers reported its performance better above 35,000 ft. than the North American F-100 Super Sabre.

►A new assault on the coast-to-coast speed record for propeller-driven planes is planned by pilot Joe De Bona. He will use the same F-51 Mustang in which he missed the record last April. Record of 4 hr., 52 min., 58 sec., is held by Paul Mantz.

►Plans to give newsmen rides in North American's new two-place F-86 Sabre jet trainer have been quashed by USAF Secretary Harold Talbott. Air Force previously had approved rides for newsmen in Lockheed's F-94.

►English Electric has produced about 600 Canberras to date. The aircraft is scheduled to appear soon in several further roles with new wings and larger engine.

►The Martin P6M jet minelayer will have the rotary bomb-bay door pioneered on the company's XB-51 triple-jet bomber and the B-57A.

►Navy will attempt a new altitude record with the Martin Viking missile this spring. Present record of 135 mi. is held by the Viking. The firing will be No. 11 in the Viking series.

►Navy, which earlier had decided to go along with USAF's claim for the North American F-100's 15-km. mark as the world's official speed record, has changed its attitude, now insists that the Douglas F4D's 3-km. mark is the official record.

►Convair's second YF-102 all-weather interceptor made its first flight at Edwards AFB last week with test pilot Sam Shannon at the controls. USAF called the flight "very successful." The second prototype delta-wing fighter was rushed to completion after the first crashed last November during experimental testing. First production models of the F-102, powered by a Pratt & Whitney J57, now are being assembled at San Diego.

►Wright Aeronautical's J67—12,000- to 15,000-lb.-thrust split-compressor jet engine—is slated to power Glenn L. Martin Co.'s four-jet XP6M-1 Seamaster.

WHO'S WHERE

In the Front Office

N. F. Vanderlipp is new president and general manager of Bellanca Aircraft Corp., New Castle, Del. He succeeds **G. M. Bellanca**, who will continue as board chairman and a director of the carrier.

Charles B. Sweatt has been elected vice chairman of the board of Minneapolis-Honeywell Regulator Co., Minneapolis. New executive vice presidents: **Tom McDonald** and **A. M. Wilson.**

Latham E. Osborne has been appointed executive vice president and a director of Westinghouse Electric Corp., New York. Other changes: **Leslie E. Lynde**, executive vice president-defense products; **W. Waits Smith**, manager of the Aviation Gas Turbine Division, Philadelphia.

Walter G. Bain is new vice president of Republic Aviation Corp., Farmingdale, N.Y.

Ray T. Elsmore has resigned as senior vice president and a director of Transocean Air Lines to devote full time to his duties as president of Western Sky Industries, Hayward, Calif.

Ford Studebaker, vice president in charge of operations and development for Hawaiian Airlines, has become assistant manager of the carrier.

Changes

S. F. McCullough, former supervising agent for CAA's St. Louis safety district office, has joined Ozark Air Lines as general sales manager.

E. Clarke Quackenbush is manager of Whitney Blake Co.'s new Electronics Division, New Haven, Conn.

Charles Knox has been appointed sales manager of Crouse-Hinds Co.'s Philadelphia Division. **Arthur F. Uhrlandt** has become sales manager of the airport lighting producer's New York Division, succeeding **Charles H. Gurney**, who has retired.

Vernon N. Ferguson has been promoted to assistant factory manager at Temco Aircraft Corp.'s Dallas plant. **William N. Rathbun** is new chief industrial engineer.

J. J. Harty has been named promotions manager for American Airlines.

Edgar H. Francois has been named sales manager of General Motors Corp.'s AC Spark Plug Division at Detroit, replacing **John C. Hines**, who has resigned.

Honors and Elections

William Littlewood, vice president-engineering for American Airlines, is president for 1954 of the Society of Automotive Engineers. New SAE vice presidents include: **R. W. Rummel** of Trans World Airlines, air transport; **F. W. Fink** of Convair, aircraft Industries Assn.'s Utility Airplane powerplant.

W. T. Piper, president of Piper Aircraft Corp., has been elected chairman of Aircraft Industries Assn.'s Utility Airplane Council for 1954 and a member of AIA's board of governors. **Charles H. Kaman**, president of Kaman Aircraft Corp., is new chairman of the Helicopter Council.

"Regulus Recovered"
Design of Chance Vought Aircraft's Regulus enables a single missile to be repeatedly launched and recovered—thus effecting great economies in the Navy's training operations.
NAVY

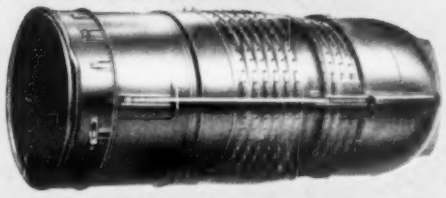
Chance Vought Aircraft INCORPORATED
DALLAS, TEXAS

AIRCRAFT Rheem DIVISION

Serving the Aviation Industry

...as prime contractors to the United States Government and sub-contractors to Douglas, Northrop, Convair, Lockheed and Westinghouse, Rheem Aircraft and Missile Division is currently building the afterburner, pictured here, for the Westinghouse J-40 engine used by the U. S. Navy.

AFTERBURNER
for Westinghouse engines



RHEEM Manufacturing Company . . . Aircraft Division, Downey, California

AVIATION WEEK VOL. 60, NO. 3
JANUARY 18, 1954

Administration's Year of Grace Over . . .

Congress Set for Showdown on Air Issues

- **Top Republican moneymen prepare further cutback of aircraft expenditures; procurement is prime target.**
- **Airlines face tough test in House fight to end subsidies, make carriers pay their way through airway user tax.**

By Katherine Johnsen

Congressmen—inclined last year to allow the incoming Administration a grace period to set its course—are prepared to make this session a showdown on numerous aviation issues.

Likely areas of conflict include:

- Airpower debate will flourish again this year.
- Cutbacks in surface forces and tactical and logistic air support will be challenged.
- Last year's skirmishing over Administration postponement of federal aid for airport development probably will break into bitter fighting before the end of this session.
- Airlines, which took no position last year, are ready for all-out opposition to the Administration's plan to boost the postal airmail rate to seven cents an ounce.
- The issue of whether Congress can cut out subsidies awarded by Civil Aeronautics Board will come up.
- Targets for criticism from several quarters will be Commerce Department's Undersecretary for Transportation, Robert Murray, and Civil Aeronautics Administrator Fred B. Lee.

▶ **Bricker Amendment**—First major issue affecting aviation on the new session's agenda is the Bricker amendment to the Constitution, which would confuse bilateral agreements with some foreign nations and U.S. participation in multilateral international air transport agreements.

One segment of legal opinion feels these agreements must be backed up by congressional legislation and conform to state laws to be valid under the Bricker amendment.

The amendment gives Congress "power to regulate all executive and other agreements with any foreign power or international organization" and requires that the agreements conform to domestic law.

Sen. Pat McCarran and others have long maintained that the U.S. bilateral air agreements bypass the spirit of the 1938 Civil Aeronautics Act, which requires hearings before CAB as the process for awarding certificates to foreign carriers. Also, international agreements on damages to airline passengers, ground property and persons are in conflict with U.S. domestic law.

The 60-plus senators who co-authored the Bricker resolution seem to assure Senate passage. House approval by a two-thirds voting majority and ratification by three-fourths of the states is necessary, however, to amend the Constitution.

▶ **Early Shapeup**—Other aviation developments shaping up in the early days of the new congressional session:

• **More airpower faster?** As last year, arguments over airpower are likely to follow party lines rather closely.

Democrats are satisfied with the Air Force goal of 137 wings, outcome of the "new look" at defense by Joint Chiefs of Staff. They say this is "the same old 143-wing program, minus only six transport wings."

USAF's former Secretary, Sen. Stuart Symington, makes this comment on the Administration's change from a 120-wing goal: "This remarkable about face will go down in history as one of the most rapid and complete changes of direction in strategic military planning ever to occur in time of peace."

Nevertheless, Democrats will make a two-pronged attack on the Administration's airpower program: (1) for delaying the buildup; and (2) for setting a too-distant date, 1957, for its achievement.

"We are now promised only 120 air wings by June 1955, which is at least 18 wings less than we would have had under the Truman program," Sen. Burnet Maybank, a member of Senate Military Appropriations Subcommittee, says.

Reporting that the Administration plans to increase USAF's $11-billion fiscal 1954 budget by only $500 million in 1955, despite talk of emphasis on air and atomic weapons, Maybank comments: "That is far from enough. That is the exact amount Gen. Eisenhower recommended as an airpower increase in the $14-billion Truman budget in the spring of 1950. The Korean war proved how wrong he was."

• **Cut aircraft expenditures?** While Capitol Hill airpower Democrats focus their attention on USAF's future goal and new money to achieve it, four top Republican moneymen are working with the Administration for a further cutback in Defense Department's estimated $38-billion defense expenditure for fiscal 1955.

Aircraft procurement spending is the prime target. This is the category of Defense Department's largest unexpended balance.

Members of the team: Chairman Styles Bridges of Senate Appropriations Committee; Sen. Homer Ferguson, chairman of the Senate Military Appropriations Subcommittee; chairman John Taber of House Appropriations Committee; Rep. Richard Wigglesworth, chairman of the House Military Appropriations Subcommittee.

• **Army, Navy, Marine cutbacks?** Democrats, although applauding the Administration's new emphasis on atomic weapons and air delivery for defense, will challenge the de-emphasis on surface forces and the tactical and logistic air support that goes with them.

Washington's Sen. Henry Jackson queries: "Aren't we going to have forces to meet limited aggressions? Are we to launch an attack on the Soviet Union or Communist China to halt a localized aggression?"

• **Defense review launched.** Democrats, who now have a one-man numerical majority in the Senate, lost no time in demanding full participation in the defense program—and apparently have won their aim.

In line with a request by Sen. Richard Russell, ranking Democrat on the Armed Services Committee, chairman Leverett Saltonstall scheduled a session with the Secretary of Defense and the chairman of the Joint Chiefs of Staff.

Whether the second part of Russell's request will be granted—that executive briefings be followed by public sessions—is questionable.

• **No more airport aid?** The Administration's plan to put off federal aid for airport development again, which stirred scattered criticism in the Sen-

ate's last session, is sure to touch off fireworks this year.

A senatorial move last year to vote airport development money, lost largely because of Administration assurances that the program would move forward after a "breathing spell" for review.

Commerce Undersecretary Murray told senators last April: "We will come back to you this year for a supplemental appropriation . . . or we will come to you next year for an appropriation . . ."

The President's endorsement of federal aid for highway development in his State of the Union message to Congress gives legislators a sound basis for their insistence on a parallel program for federal airport aid.

• **Airmail postal rates.** Airlines are ready for a last-ditch fight against the Administration's recommendation to increase the airmail postal rate from six to seven cents an ounce. Last year, the industry took no position.

But surface mail at three cents an ounce (which would go to four cents under the Administration plan) now is moving by air in bulk, and the service likely will be expanded.

Airlines do not think senders will pay seven cents a letter to "guarantee" it will go by air when the odds are that it will go by air for four cents.

• **Airline subsidies.** Requests for subsidies face their first and probably toughest test when House Commerce Appropriations Subcommittee takes them up in the near future.

The subcommittee's chairman, Rep. Cliff Clevenger, and ranking minority member, Rep. John Rooney, long have demanded an end to government airline assistance. They initiated demands more than five years ago that airlines pay their own way by airways user charges. They blocked money for development of commercial prototypes as subsidy to airlines.

Senate's Commerce Appropriations Subcommittee is considerably more amenable to government promotion of air transportation.

• **Airways user charges.** Congress will move slowly in enacting a system of user charges for airways when it is submitted by the Administration early in the session.

It is not likely to go further than an increase in gas tax, the method used to retrieve outlays for highways.

• **Civil aviation reorganization?** Legislation introduced by Rep. Carl Hinshaw would take CAB out of Commerce Department and reestablish it as a completely independent civil aeronautics commission and put Civil Aeronautics Administration under an undersecretary of commerce for air services.

Hinshaw is critical of the dominance in civil aviation activities that has been exercised by Undersecretary Murray.

• **Air policy review?** Sen. John Sherman Cooper will conduct an "impartial" review of aviation policy, if Senate Commerce Committee gives him the green light. He was named chairman of a subcommittee to undertake this by the late Sen. Charles Tobey.

But Commerce Committee's new chairman, Sen. Bricker, has not been enthusiastic for the review. If it is not voted by the committee, Cooper probably will accept a post on the Labor and Public Welfare Committee and drop from the Commerce Committee.

• **Air academy?** With the blessing of Defense Secretary Charles Wilson, authorization for an air academy appears to have some slim hope for enactment.

House Armed Services Committee has opened hearings on the matter. But still it must buck the economy drive and the pull-and-drag of members of Congress over the location.

115-Wing AF

Air Force will have 115 wings by the end of this fiscal year, Defense Secretary Charles E. Wilson reports.

He says this is five wings more than originally had been expected by that time. USAF should have 121 wings by the end of fiscal 1955, he adds, a figure it did not expect to reach until fiscal 1956.

Hughes Charity

- **Medical institute takes over aircraft company.**
- **Flying boat and copter not included, sources say.**

Los Angeles—Howard Hughes last week disposed of his Hughes Aircraft Co.—turning it over to the Howard Hughes Medical Institute.

The move ended months of speculation about a possible sale of the $200-million-a-year aviation concern (primarily avionics).

To set up the medical institute, Hughes reorganized his aircraft holdings. He severed the aircraft company from its parent concern, the Hughes Tool Co., and installed himself as president.

► **Substantial Part**—The medical institute was incorporated in Delaware and then took sole ownership of a "substantial part" of the Hughes Aircraft Co. as the initial donation from its multi-millionaire founder.

Under Delaware law, it formed a wholly owned subsidiary corporation named Hughes Aircraft Co. (AVIATION WEEK Jan. 4, p. 7).

"The assets which constitute the initial donation referred to in today's announcement have been transferred by the institute to this wholly owned subsidiary corporation, which in turn will operate the business," Hughes announced.

He did not explain what "substantial part" of the aircraft company was transferred to the medical foundation. His public relations representatives, Carl Byoir & Associates, said they had been ordered to release no further details.

► **Flying Boat Retained?**—But Hughes is believed to have retained his aircraft projects, such as the flying boat and the giant helicopter. During the last negotiations for sale of the aviation firm—a deal that fell through when he failed to come to terms with Lockheed Aircraft Corp.—reliable sources said the industrialist planned to retain the aeronautical part of the company, including the Culver City Airport where his avionics plant is located.

After collapse of the Lockheed negotiations and later management troubles that rocked the Hughes plant, AVIATION WEEK learned the multi-millionaire had decided against selling the concern (AVIATION WEEK Oct. 26, 1953, p. 100).

► **25-Year Plan**—Hughes revealed that his will for 25 years has provided for creation of a medical research institute. He said he decided five years ago to start it during his lifetime.

The Byoir announcement quoted Hughes as saying the new medical foundation will undertake medical research and development toward improvement of the "physical well-being of mankind."

He said it will not attempt to duplicate the work of the nation's private, state and county hospitals and will not engage in direct treatment of patients except as required for research.

The non-profit charitable institution "will provide millions of dollars for medical research to combat disease and human suffering," said the Hughes announcement. With Hughes Aircraft Co.'s current backlog of some $600 million, it seemed the institute would have ample funds for its task.

► **Tax Saving**—In Washington, industry observers point out these two objectives of the financial transaction:

• **Substantial tax benefits** through operation of the aircraft company as a subsidiary of a charitable institution.

• **Creation** of a board of directors to assist in operation of the avionics business, a move the Air Force is understood to favor.

As a subsidiary of Hughes Tool Co., the aircraft firm was under the single direction of Howard Hughes.

BuAer Clamps Censorship on Contractors

New Navy security directive claims control over unclassified information; one industry spokesman calls it 'political censorship.'

By William J. Coughlin

U. S. Navy last week was distributing a new military security directive which, if enforced, could open the door to a news blackout and political censorship—contrary to President Eisenhower's instructions.

Portions of the new security regulation were so harsh that strict enforcement would render effective news coverage virtually impossible.

The document was Navy Bureau of Aeronautics Instruction 05510.19 entitled Security Classifications and Publice Release Guide for BuAer Equipment and Projects, dated Dec. 7, 1953.

►**AF to Follow**—It was being distributed to all Navy units concerned, as well as plants holding Navy BuAer contracts. The spokesman for a major aircraft plant termed it "not security review, but political censorship."

One source said the Air Force planned to issue a similar document shortly.

The Navy instruction ironically was a result of White House Executive Order No. 10501, which eliminated the security classification of Restricted as a part of President Eisenhower's plan to foster, rather than hinder, dissemination of information on government activities.

►**From Directive**—Existence of the Navy document, which was classified Confidential when received at aircraft plants, was disclosed to AVIATION WEEK by an industry source.

Here are quotes from the Navy directive:

• "The declassification of information

Highlights of New BuAer Security Instruction

Here are pertinent excerpts from Navy BuAer Instruction 05510.19 dealing with public release of information:

9. Public release of information. The declassification of information does not constitute authority for its public release. The authority for initial release rests with the Security Review Branch, Office of Public Information, Office of the Secretary of Defense. The following policies and procedures govern the release of classified information under the cognizance of the Bureau of Aeronautics:

A. Addressees, BuAer contractors, subcontractors, and suppliers desiring public release of information which has not previously been authorized for public release shall submit quadruplicate copies of such proposed releases direct to the Security Review Branch, Office of Public Information, Office of the Secretary of Defense, for security review and permission to release. One copy shall be forwarded to the Bureau of Aeronautics for retention.

B. The Office of Public Information, as part of its normal procedure, will forward copies to the Bureau of Aeronautics for review. The Bureau of Aeronautics will return all such material, together with comments and recommendations, to the Office of Public Information via the Chief of Information, Department of the Navy, in accordance with OpNav Instruction 5430.4 of 13 March 1953.

C. Information derived from classified BuAer contracts or subcontracts thereof, or other military information which has been designated by the Department of Defense on the subject basis as requiring clearance, will not be released for public dissemination except after clearance by the Office of Public Information.

D. Contractors are responsible for the security of classified information which may come into their possession as a result of contracts with the Bureau of Aeronautics. Classification listings contained in the Security Requirements Check List (DD-254) or subsequent revision thereof by this instruction are most valuable in preparing information for public release.

E. Unauthorized publication does not constitute authority for addressees or industry to confirm, deny or authorize subsequent republishing of information so published. Specific clearance as required by this instruction must be obtained before any such information may be officially released.

F. Information officially cleared for publication is in the public domain and cannot subsequently be withdrawn regardless of any change in classification of the project from which the information developed. Only that information which was previously cleared may be released without additional clearance.

G. Contractors and addressees who anticipate imminent declassification of matter under the cognizance of this bureau may prepare and forward for security review such proposed releases as are compatible with the anticipated category change providing they properly classify such material.

It shall be understood that material so submitted will either (1) not be returned approved until appropriate downgrading of the project concerned permits approval for release, or (2) classified portions will be deleted and corresponding approval for release granted, or (3) circumstances permitting, material so submitted may be returned to the originator still classified but with approval to declassify and release it on a specific date or upon the transpiration of a specific event.

Instructions for transmittal of classified matter must be observed when submitting proposed releases in accordance with this paragraph.

H. Information which is directly releasable in accordance with Department of Defense directives may be disseminated to the public.

I. All proposed releases which are of national interest or importance are subject to review by Office of Public Information for possible issuance as joint releases.

J. Before a news media representative or private writer is authorized to make the initial visit to a military installation or contractor facility for the purpose of obtaining information for public release, such visit must be approved by the Bureau of Aeronautics and the Office of Public Information.

News announcements may be of such national importance that defense-sponsored press tours and demonstrations may become necessary. The exact time and date of the press tour as well as the date and time when the information may be released will be decided by the director, Office of Public Information, in advance of the tour so as to assure maximum dissemination of the information with a minimum of elapsed time between the tour itself as to release to the public of the material.

Approved visits will be governed by:

(1) Only information known to be unclassified will be disclosed. Classified information will not be revealed on an off-the-record basis as background material.

(2) Cooperation will be given to news media representatives on the condition that final material will be submitted to the Office of Public Information for security review prior to submission to a publisher or other public information media. A minimum of one week should be allowed for clearance. Material should be submitted in quadruplicate to facilitate clearance with interested agencies.

does not constitute authority for its public release."

• "Before a news media representative or private writer is authorized to make the initial visit to a military installation or contractor facility for the purpose of obtaining information for public release, such visit must be approved by the Bureau of Aeronautics and the Office of Public Information."

• "Cooperation will be given to news media representatives on the condition that final material will be submitted to the Office of Public Information for security review prior to submission to a publisher or other public information media. A minimum of one week should be allowed for clearance. Material should be submitted in quadruplicate to facilitate clearance with interested agencies."

• "All proposed releases which are of national interest or importance are subject to review by Office of Public Information for possible issuance as joint releases."

▶ **Dangerous Clause**—This magazine queried aircraft industry spokesmen for their interpretation of the latest BuAer security ground rules.

Insistence by the Pentagon that it has the right to withhold information from the public on grounds other than military security was considered one of the most dangerous clauses of the document and a direct violation of pledges of the Eisenhower Administration.

"What possible right has the military to demand to control the release of information that is not classified?" asked one of those questioned. "This is the ultimate abuse of security."

It was pointed out also that the necessity for Washington clearance on each visit of a newsman to a contractor's plant, which in turn would depend upon his agreement to submit all copy to the Defense Department for clearance, offered unlimited possibility for a political coverup.

"This is an extremely dangerous situation," warned the spokesman for a major airframe manufacturer.

▶ **Exclusives Out**—Unfairness of the provision that called for joint release of a newsman's exclusive story if it were of sufficient national importance was considered apparent. There was some question whether this was the intent of the Navy, but several companies said they had interpreted the document to mean this.

In most cases, spokesmen for the aircraft plants said they would ignore the strict terms of the directive in order to continue their services to the press.

"This leaves us in a very vulnerable position, however," commented one.

A spokesman for the Aircraft Industries Assn. said his office had not yet received a copy of the directive but was very much interested in its implications. "This sounds worse than wartime censorship," he said.

▶ **AF Meeting**—Many industry representatives felt the new provisions were so harsh that they could not possibly be enforced.

The Navy representative at one plant, when asked by the company for an official interpretation of the new document, replied: "I can't put this in writing but my advice to you is to continue as you have in the past and ignore the new regulations."

AVIATION WEEK learned that top USAF security review officers held an off-the-record December meeting with industry public relations representatives to explain new security regulations then pending. At that meeting, this magazine is told, the Air Force insisted upon its right to withhold information even when unclassified.

"Any time anyone tells me that the military can withhold information on grounds other than security, I look for political censorship," said one of those who attended the meeting.

▶ **Public's Money**—Air Force officers in one justification of their position argued that aircraft manufacturers certainly would not give out information on their airline contracts if the customer did not wish the information released, AVIATION WEEK is informed.

One industry reply to this stand was that airline contracts are private business between private concerns; the Air Force is spending public money.

One industry spokesman said, in effect: "The people are entitled to know anything about Air Force business that is not classified for bona fide security reasons."

Whether Defense Secretary Charles E. Wilson had approved the new policy was not clear, although the Navy document—stating that even unclassified information would have to be cleared—instructed contractors to forward quadruplicate copies of proposed releases to the Security Review Branch, Office of Public Information, Office of the Secretary of Defense.

▶ **Classified List**—The Navy BuAer instruction was sent to aircraft plants marked Confidential, due to enclosure of a list of classified Navy projects to which new security classifications would apply. Classification could be reduced to Unclassified, it noted, by removal of the list.

By its own definition, however, this would not constitute authority for release of the document to the press without prior approval by the Defense Department.

The source who turned the unclassified document over to AVIATION WEEK violated the instructions contained therein by doing so.

The Navy apparently intended to limit circulation of the document. One of the largest aircraft plants on the West Coast received only one copy.

The instructions listed the new security classifications as Secret, Confidential and Unclassified. It appeared to some observers that in following the President's order to eliminate the Restricted category, the Navy had come up with a new security classification entitled, strangely enough, Unclassified.

Comet Future?

- **Jet airliners grounded following sixth crash.**
- **Accident believed caused by inflight explosion.**

By Nat McKitterick
(McGraw-Hill World News)

London—Fatal crash last week of the sixth Comet jet transport in 15 months leaves the future of the Series 1 airliners very much in doubt.

British Overseas Airways Corp.'s Comet G-ALYP crashed after taking off from Rome, killing 29 passengers and six crew. The airline immediately grounded its remaining fleet of six operational Comets, with Air France and Union Aeromaritime de Transport taking similar action with their five.

The Comet took off from Rome's Ciampino Airport for London as an extra-section supplement to BOAC's weekly London-Singapore service. It fell out of clear sky from about 25,000 ft., crashed into the sea 10 mi. off the Island of Elba.

▶ **Explosion Theory**—An inflight explosion may have caused the crash, initial evidence indicates. Doctors who examined bodies of 15 victims report all died before the plane hit the water. All suffered crushed lower limbs, regarded as indicating some sort of explosion—possibly an engine but more probably a blast somewhere under the fuselage, such as undercarriage bay.

Despite eyewitness reports that the plane came down in flames, doctors say none of the recovered bodies was burned.

▶ **Buried Engines**—Possibility of turbine rotor failure in jet aircraft with buried engines long has been questioned by Civil Aeronautics Administration authorities investigating U.S. civil jet standards. But if this happened in the Elba crash, it will be the first recorded instance involving the de Havilland Ghost engine.

DH has had 130,000 hr. experience with the centrifugal Ghosts, four of which power all Comet 1s.

Neither explosive decompression nor sabotage can be ruled out at this stage. The wreckage is in 40 fathoms of water and with it lie most clues. BOAC says

it will spare no expense in salvaging the wreckage, but it is not even known whether there are any sizable pieces of the plane intact.

In announcing the decision to ground the Comets—an action pressed by the Air Registration Board and the British Ministry of Civil Aviation—BOAC said it would "carry out a minute and unhurried technical examination of every aircraft in its Comet fleet." This will take place at London Airport.

▶**Comet Future**—The future of the Comet 1s thus is very much in doubt. Considerable modifications already are being made on Series 2 Comets as a direct result of Comet 1 accidents. Three Series 2s (two production types) now are flying with jury-rigged droop-snoot wings designed to give greater lift.

Latter modification, which will be incorporated in all production types, results from the first two Comet crashes—both on takeoff: First, BOAC Comet failed to become airborne at Rome Oct. 26, 1952; second, Canadian Pacific Airlines Comet crashed on takeoff at Karachi last Mar. 2.

And mystery of the third Comet crash—BOAC disaster near Calcutta May 2 in which 43 persons died—has not been solved satisfactorily. An Indian court of inquiry recommended consideration be given to modifying the Comet's control system "in order to give the pilot a positive feel of air loads exerted on his control surfaces."

▶**Resist Action**—De Havilland so far has resisted this recommendation, at least pending the outcome of a study of the wreckage of the Calcutta crash by the Royal Aircraft Establishment at Farnborough. No hint of Farnborough's findings has leaked out.

Fourth Comet 1 crash occurred at Dakar, French West Africa, last June 25 when a UAT Comet landed too far down the runway and plowed into a concrete abutment. There were no injuries, but the plane was a total loss.

A fifth serious Comet accident occurred at Calcutta's Dumdum Airport last July 25 when another BOAC jetliner skidded off the runway while taxiing for takeoff. The port wing spar was badly sprung, and the plane still is sidelined at Calcutta while DH completes rebuilding the wing.

▶**Other Troubles**—At one point last July, BOAC's original fleet of nine Comets was reduced to four operational aircraft through accidents.

In late summer, the carrier bought CPA's remaining Comet 1 and thereby bolstered its operational fleet to seven.

Up to the Elba crash, the four Comet operators (including Royal Canadian Air Force) had built up 30,000 hr. experience in the air, covering 12 million mi. The three commercial operators were averaging 180,000 mi. per week.

Britain Losing Jet Lead: Sopwith

Deficiencies in high-altitude, highspeed research are cited in report by Hawker Siddeley chairman.

(McGraw-Hill World News)

London—Sir Thomas Sopwith, chairman of the Hawker Siddeley Group, says Britain's lead in jet aircraft development has been cut down and, in certain respects, lost.

"We as a nation should be spending much greater sums on high-altitude and highspeed research," the chief of Britain's largest combination of military aircraft builders warns in a report to Hawker stockholders.

"Where are our research projects for applying nuclear fission to aircraft production?"

▶**U. S. Atomic Lead**—Sopwith's question confirms an AVIATION WEEK (Dec. 21, p. 21) statement that the British are far behind the U.S. in study of atomic power applications to aircraft.

His warning on high-altitude and highspeed research, which follows a considerable press campaign in the same vein, illustrates the uneasiness felt here because of the achievements of the Bell X-1 and the Douglas Skyrocket in the U.S. As far as is known, there are no comparable British projects near flight stage. In fact the basic test facilities, particularly supersonic windtunnels, are virtually non-existent. Armstrong-Whitworth, a member of the Hawker group, will begin operating Britain's first large supersonic tunnel "within a few months," according to Sopwith.

▶**Lion's Share**—On missiles and guided weapons, absorbing the lion's share of Britain's tight aeronautical research budget. Sopwith expresses more satisfaction.

Armstrong-Whitworth, the group member concentrating on missiles, is making "good progress," Sopwith says. "We have had satisfactory results in testing advanced types of weapons, equipped with electric and electronic apparatus."

But Minister of Supply Duncan Sandys reports Britain has yet to put its first missile into production. Royal Air Force officers explain that, for economy reasons, Britain cannot afford to spend money on "interim" types.

▶**Development Direction**—Sopwith gives a small hint about the direction of British missile development, saying: "Many of the guided missiles under development are designed to be fired in the air from piloted airplanes."

This seems to support other public evidence to the effect that the guided bomb and air-to-air missiles have high priority in the British program.

The latter may be used as armament on all-weather fighters, such as the Gloster delta-wing Javelin and on other intruder types designed to seek out enemy bombers over or near their home bases.

Armstrong-Whitworth, English Electric, Fairey Aviation, Bristol Aeroplane and de Havilland Aircraft have permanent staffs at Britain's huge testing station at Woomera, Australia. According to a recent Australian report, some 700 rockets and 440 missiles have been fired at Woomera since 1950.

▶**Maligned Industry**—On production, Sopwith claims the British aircraft industry is much maligned.

"The Ministry of Supply and leading

New Agricultural Plane

Initial photo of a Piper Cub that has been extensively modified to reverse-stagger biplane configuration to increase spray/dust payload while retaining low wing loading necessary for good maneuverability. Plane is fitted with tandem one-wheel landing gear for operation from rough fields. Ranger 200-hp. powerplant and cowling have been taken from a Fairchild PT-19 trainer. Designated Model 11 by General Airplane Service, Sheridan, Wyo., payload is 1,500 lb. and gross weight is 3,000 lb.

American aircraft constructors themselves," Sopwith contends, "agree that the time lag between conception . . . and the day when (an airplane) is in squadron service is about the same here as in the U.S."

But the rate of production is another story. Because of larger orders, allowing a greater investment in tooling, the U.S. can roll production types off assembly lines much faster than the British.

▶ **U.S. Dollars**—Sopwith's transonic Hawker Hunter currently is the biggest production item in the British industry. The larger share of production cost of the Hawker Mk.1, powered by Rolls-Royce Avon R.A.7 jets, is being financed by the U.S. under the off-shore purchase program.

So far, $150 million has been spent here by the U.S. to buy 468 Hunters. Soon additional orders for perhaps 200 or more Hunters will be placed by the same source.

This method of financing is somewhat misleading.

In effect, the American money is direct financial aid to the RAF. It does not reflect new orders for Hunters or any other type of aircraft. Because the money was appropriated under the heading "off-shore purchase" and USAF test pilots approved the Hunter for NATO, the money theoretically is spent on procuring Hunters.

In fact, the effect of the money is to allow the RAF to maintain a balanced production program of all types.

Also slated for off-shore purchase support this year is the Gloster Javelin, produced by the Hawker group. Javelins will be coming off the production line at Gloster early next fall.

▶ **Inadequate Dive Brakes**—There are nearly 70 Hunters in the first flight stage now, but they are not operational and no squadrons have been formed.

Missing, among other things, are adequate dive brakes. One Hunter prototype has brake panels at the extreme tail, straddling the jet pipe and actuated by jacks faired into the rear fuselage.

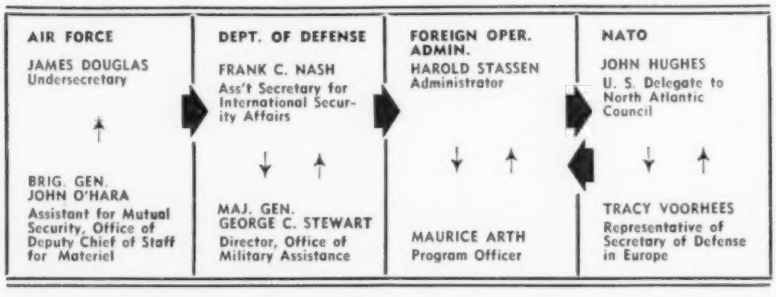
It has not been decided whether to adopt this arrangement.

Will the Hunter try to recapture the new world's speed record? "We do not intend to make another attempt on the record at the moment," says Sopwith, "as all our resources are being concentrated on the production drive."

The Mark 2 Hunter, powered by an Armstrong Siddeley Sapphire jet, will be produced by Armstrong Whitworth at Baginton, near Coventry. A small order has been placed.

▶ **Sea Hawk Output**—Armstrong Whitworth also is producing the Hawker Sea Hawk naval fighter, squadrons of which were formed late last year.

The U.S., again under the off-shore program, put up $13 million for Sea Hawk production (100 aircraft) to substitute for some Douglas Skyraiders —promised under arms aid but not available.



AF Outlines NATO Plane Output

U.S. participation in North Atlantic Treaty Organization's joint Aircraft Program for fiscal 1954, reported at $200 million, has been blueprinted by USAF.

Program is aimed at increasing aircraft production in NATO countries.

Key steps and men concerned in direction of the program:

• **Air Force.** USAF has been designated as the agency to implement the Batt-Ismay recommendation to build up Europe's air industry and to work out the plan for the U.S. aspect of the program.

This is handled under the direction of the mutual security assistant in the office of the Deputy Chief of Staff for Materiel, a post held by Brig. Gen. John O'Hara. After review by the Undersecretary of the Air Force, it is transmitted to the Assistant Secretary of Defense for International Security Affairs.

• **Defense Department.** Maj. Gen. George C. Stewart does the spade work of review at this level, before the plan is submitted to the Foreign Operations Administration.

• **Foreign Operations Administration.** The Air Force program for U.S. participation goes to John Hughes, U.S. Delegate to the North Atlantic Council (composed of representatives of secretaries of state of the 12 NATO nations) and director of off-shore procurement in Europe.

Hughes, in cooperation with Tracy Voorhees, former Undersecretary of the Army, works out the program of participation by European countries. Basic work by FOA on the joint program, mainly overseeing and making policy decisions, is handled by Maurice Arth, former scheduling supervisor for Douglas Aircraft Co.

FOA puts up the money for the U.S. participation, but the negotiating of contracts with European aircraft firms is done by Air Force. Fiscal 1953 program totaled $583 million; the U.S. put up $300 million (AVIATION WEEK Sept 14, p. 22).

Bell Builds Mach 1.5 Air-to-Surface Missile

Development of a pilotless bomber, the XB-63 Rascal, has been announced by Bell Aircraft Corp. and USAF.

Engineering and performance details were not released officially, but industry observers identified Rascal as an air-to-surface missile.

▶ **X-1 Influence**—The XB-63 is a small, rocket-propelled aircraft that resembles the Bell X-1 research aircraft series. Design of the pilotless bomber was influenced greatly by the company's experience with the X-1.

Lawrence Bell, board chairman of Bell Aircraft, recently said the X-1A flight test program was gathering valuable data for missile development. Bell hinted at the speed range of the Rascal —reported to exceed Mach 1.5—when he added that Maj. Charles Yeager had flown faster in the X-1A than many guided missiles (AVIATION WEEK, Dec. 28, 1953, p. 16).

▶ **Bomb-Bay Release**—Launching gear similar to that used to drop the X-1 from its mother ship is used to release Rascal from bomb-bay of a B-36, B-50 or later jet bomber.

Release point is about 100 mi. from the surface target to keep the delivering bomber well out of the striking range of anti-aircraft missile defenses.

After drop, initial guidance comes from a preset programming device in the Rascal. For midcourse and terminal guidance, the mother plane takes off by radar.

Rascal presumably uses its rocket engine to accelerate in level or climbing flight, reaching its maximum speed when the propellants are exhausted.

Terminal portion of the flight path could be either a long glide, or a push-over into a steep dive, with the latter approach being preferred tactically.

FIRST PRODUCTION MCDONNELL F3H-1N Demon, in dark blue Navy service colors, displays sharply swept wings and tail.

Navy Gets New Demon

Navy has accepted the first production model of the new dual-purpose all-weather fighter and fighter-bomber McDonnell F3H-1N Demon. Officials call the Demon the first of an entirely new series of carrier-based fighters.

Initially powered by a Westinghouse J40 turbojet with afterburner, the Demon will be equipped with the more powerful Allison J71 when this engine becomes available.

▶ **Cannon and Rockets**—The new fighter's basic armament consists of fast-firing, high-velocity 20-mm. cannon. Multiple combinations of external stores, including a large number of air-to-air rockets also can be fitted. Latest type of computing and fire control equipment is carried.

The sharply swept wings have full-span leading edge slats that are power actuated, as are the trailing edge slotted flaps. Speed brakes are located in the fuselage. The entire horizontal stabilizer is movable.

▶ **Long Fuselage**—The Demon comprises a large package. Fuselage is more than 59 ft. long while wing span is 35 ft. 4 in. The fighter stands almost 14 ft. high.

Prototype XF3H-1 Demon first flew Aug. 7, 1951, at Lambert-St. Louis Municipal Airport, Mo. Since then, the plane has undergone extensive tests including carrier qualifications trials aboard the USS Coral Sea (pictures p. 9).

LARGE FUSELAGE carries cannon armament and considerable avionics equipment.

COCKPIT PLACEMENT provides pilot with good visibility while landing big fighter.

New ANDB to Get Policy-Level Staff

Defense and Commerce Departments last week approved the charter for a more powerful Air Navigation Development Board, staffed by top-level civil and military representatives.

The move is intended to revitalize the lagging development of the country's common (civil-military) system of navigation and traffic control (AVIATION WEEK Nov. 9, p. 108).

▶ **TACAN vs. DME**—First major task assigned to the reorganized ANDB is to resolve the question of whether Civil Aeronautics Administration should abandon its present civil DME (distance measuring equipment) for a newer military, short-range navigation system, TACAN (AVIATION WEEK Dec. 7, p. 40).

ANDB was established in November 1948 by the Secretaries of Defense and Commerce to guide and sponsor research and development for a common military-civil system of air navigation and traffic control.

Major changes in ANDB operations resulting from the new charter:

• **Top-level representation.** Air Force, Navy, Army and Commerce representatives on the board will be selected from high-policy levels in their organizations, enabling them to speak with authority, make commitments. Defense Secretary also will have a representative on the board.

• **Better integration.** Board members selected will be responsible for their own agency's navigation aids procurement, installation and operation, as well its navigation aids research and development, to integrate more efficiently future development programs with existing system commitments.

• **Project funding.** ANDB funds will come from all participating agencies. Previously, all funds came out of Commerce budget.

• **Board chairman.** ANDB chairman may be selected from its own members or from outside. Original charter specified chairman be selected from outside.

• **Outside assistance.** Charter directly encourages board to make maximum use of outside advisory groups, such as Radio Technical Commission for Aeronautics.

▶ **Full-Time Staff**—The board, which will meet at least every three months, will have a full-time staff and director to supervise and carry out its daily operations. Staff will be selected by the board, appointed by Commerce Secretary, with approval of Defense Secretary. Staff will include individual full-time representatives for each of the board members.

ANDB common system research and development projects will be contracted for or performed by the individual agencies. Defense and Commerce Departments will have equal authority and responsibility under the new charter. In the event of disagreements between Defense and Commerce, the matter is to be referred to the respective department secretaries for a joint determination.

TOM BRANIFF and wife (left) at the airline's 25th anniversary celebration last year.

Braniff Dies in Louisiana Crash

Thomas E. Braniff, founder and president of Braniff International Airways, was killed last week when a privately owned Grumman Mallard crashed and burned near Shreveport, La. He was 70.

The aviation pioneer started the Southwest's first passenger air transport service in 1927, flying 116 mi. from Tulsa to Oklahoma City. After a year of operation, the line merged with Universal Aviation Corp.

Braniff became founder-president of the airline in 1930, a post he held throughout the carrier's growth to its present system covering 17,833 mi. He built Braniff Airways into the sixth largest U. S. domestic carrier, 12th biggest in the world.

Business Planes Crash

Business flying for 1954 begins on a tragic note with four plane crashes reported to date, one resulting in the death of Thomas E. Braniff, president of Braniff International Airways.

Braniff, nine other passengers and two pilots, were killed when a United Gas Co. Grumman Mallard—crippled by icing conditions—attempted an emergency landing on a Louisiana lake en route from a hunting trip in the southern part of the state to Greater Shreveport Municipal Airport.

The plane hit a power line during its landing approach, crashed into a shed on the lake shore and burst into flames.

Among the other nine passengers were presidents of two companies owning business planes: R. H. Hargrove, Texas Eastern Transmission Corp., and Edgar Tobin, Tobin Aerial Survey Co.

The three other crashes, with the wreckage of one not located:

• **Fullerton Oil Co.'s** Douglas B-26 nosed into a residential area en route to Burbank, Calif., from Grand Central Airport, Glendale.

• **Lockheed Lodestar,** owned by Walker Inman of Georgetown, S. C., crashed and burned on takeoff from Teterboro Airport, N. J.

• **Beechcraft 17,** owned by the Springfield (Mass.) Daily News, went down en route from Bradley Field, Hartford, Conn. to Richmond, Va. It was believed to have crashed in the vicinity of Long Island Sound.

Gale Alexander, 53, aircraft mechanic and former barnstorming pilot, died of burns suffered when the B-26 crashed into his apartment and set it afire. The two pilots, only occupants of the converted lightbomber, were injured. Pilots and the plane's two passengers escaped injury in the Lodestar crash, while little hope was held that the pilot and sole occupant of the Beechcraft survived.

WINGS for faster fledglings

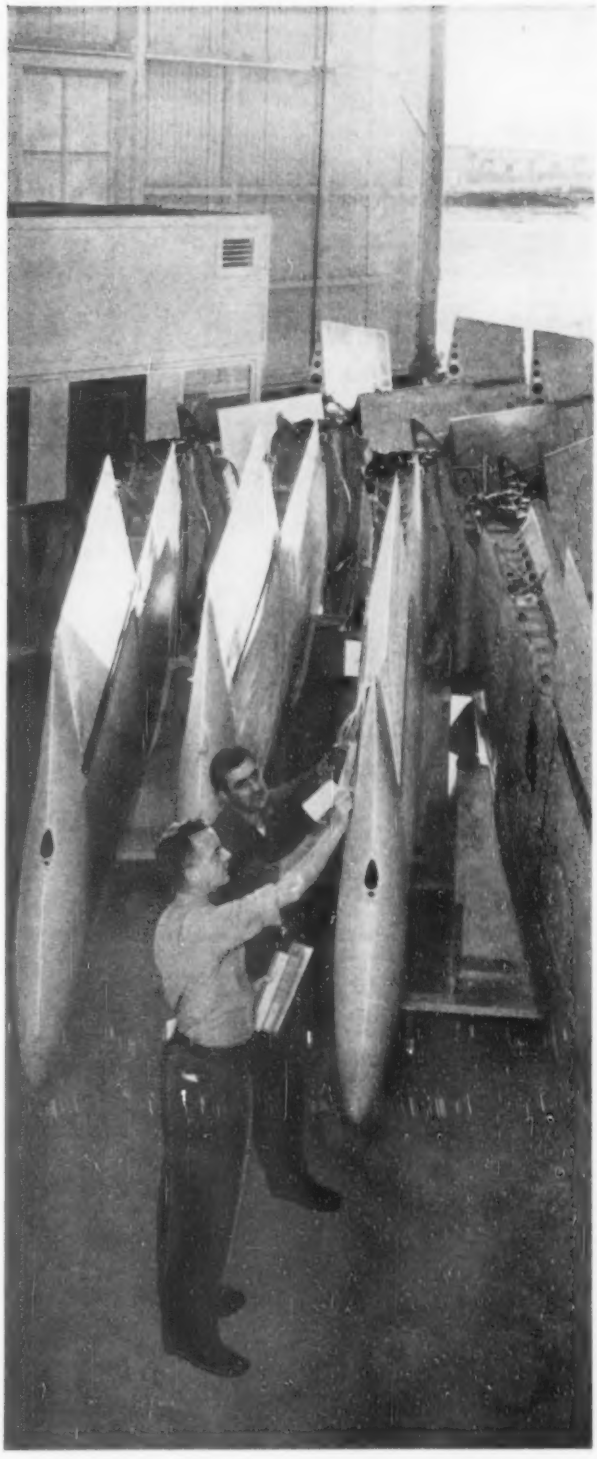
JET pilots still have to learn to fly in propeller-driven aircraft, so the Air Force has adopted the high-speed T-28 as its advanced trainer — a plane specifically designed for preparing future jet pilots.

For this newest and most modern trainer, Goodyear Aircraft Corporation builds the complete wing assembly — as well as components for the ship's empennage—at Goodyear's Litchfield Park plant in Arizona; and optically clear Rotoform canopies, plus wheels and brakes for the T-28, at its Akron plant.

This production ability is typical of Goodyear Aircraft, which has complete facilities for building the largest type aircraft in use today—as well as the engineering skill it takes to produce such highly technical devices as electronic computers, radar assemblies, radomes and many other types of aviation equipment used on all military and commercial aircraft today.

This flexibility—in engineering, design, testing and fabrication—makes Goodyear stand out as America's most versatile aircraft manufacturer.

If you would like more details on the unique "air support" provided the aviation industry by Goodyear Aircraft, write: Goodyear Aircraft Corporation, Department 65, Akron 15, Ohio.



Complete wing assemblies—built by Goodyear Aircraft—for North American Aviation's T-28 airplane. The T-28, newest and most modern of the Air Force training planes, actually carries more equipment than the famed Mustang fighter of the Second World War.

GOODYEAR AIRCRAFT

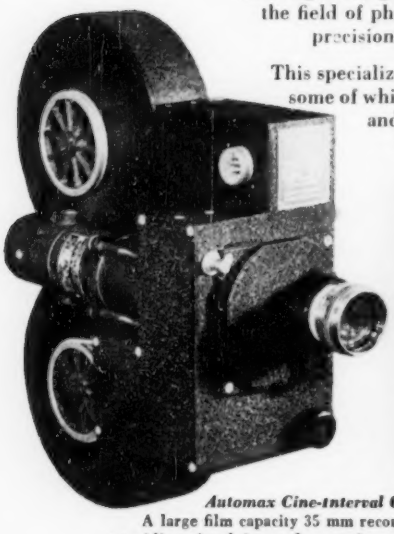
☆ *The Team To Team With In Aeronautics* ☆

We think you'll like "THE GREATEST STORY EVER TOLD" — every Sunday — ABC Radio Network — THE GOODYEAR TELEVISION PLAYHOUSE — every other Sunday — NBC TV Network

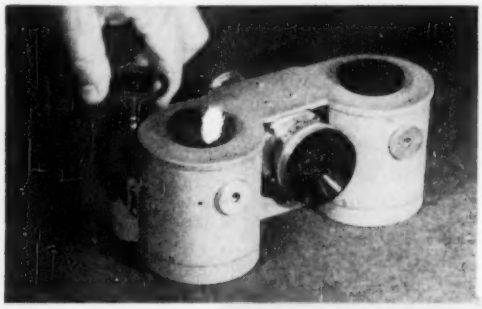
HEADQUARTERS FOR PHOTOGRAPHIC INSTRUMENTATION

Our Photographic Instrumentation Division has been established to further the use of photosensitive media for the detection, recording and/or measurement of scientific and engineering phenomena. This Division is particularly qualified to operate in the field of photographic instrumentation because of its wide engineering experience with precision instruments and photographic applications.

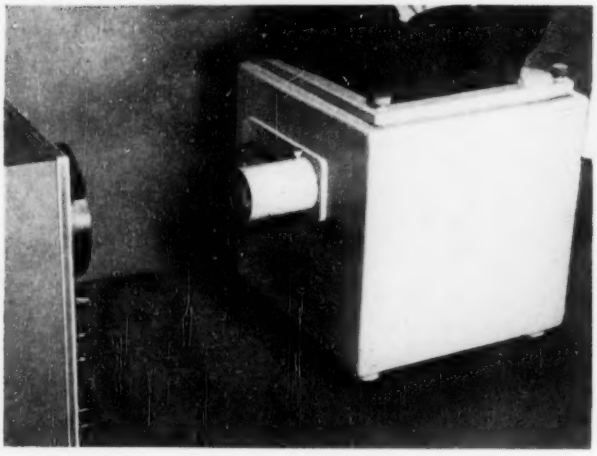
This specialized instrumentation division deals in a broad line of photographic products some of which are described below. We will be glad to assist you in the selection, procurement and application of photographic instrumentation equipment to suit your specialized needs. A statement of your problem will receive our prompt attention.



Automax Cine-Interval Camera – A large film capacity 35 mm recording instrument providing timed interval operation up to 10 frames per second or cine exposures at 16 per second. Designed to operate under severe environmental conditions such as encountered in aircraft testing applications.



Auto Camera Mk 3 – A large film capacity 35 mm recording camera for industrial and scientific application. Electric control permits exposures to be made as rapidly as 4 per second.



Robot-Star Camera – A motorized 35 mm single framing or rapid sequence camera which gives 55 exposures 24 x 24 mm on each standard (36 exposure) roll of film. With electrical control the exposure rate can be as fast as 8 per second.

Universal Recording Camera, M.731 – Particularly adapted to record oscilloscope trace information by either single frame exposures, continuously moving film or high speed drum photography. All three methods provided in this one instrument.

Other Maurer Products – High-speed motion picture cameras • high-speed, high power stroboscopes • image converter equipment • under-water cameras • special light sources • medium and heavy duty tripods and others . . .

J. A. MAURER, inc.
Photographic Instrumentation Division
37-01 31st., Long Island City 1, N. Y.

Fight on Air Act

- **Skeds strongly endorse '38 law's present form.**
- **TAG asks four changes to aid airfreight lines.**

Divergent recommendations on air transport policies were submitted last week to the President's Air Coordinating Committee by two leading airline associations:

• **Air Transport Assn.**, the scheduled airlines organization, strongly backed the 1938 Civil Aeronautics Act as is.

• **Transport Air Group**, the airfreight association, requested four amendments to the act and additional legislation aimed at fostering more rapid development of the airfreight industry.

ACC's report on its survey of national aviation policy is due to be presented to the President Apr. 1.

▶ **Policy Paid Off**—The policy established by the 1938 act, ATA notes, provides financial aid for each certificated mail air carrier to the extent required for the commerce, postal services and national defense of the United States.

"That such a policy has paid off," says ATA, "is indicated by the fact that today the scheduled airlines are carrying about 95% of the airmail without subsidy."

Other ATA policy recommendations:

• **With respect** to the large irregular carriers, U. S. aviation policy should return in practice to that set forth in the Civil Aeronautics Act, thereby bringing an end to the dual standard of economic and safety regulation which has been created within the U. S. air transport industry.

• **Military Air Transport Service** should have as its objective the training of military personnel in air transport operation and the maintaining of a nucleus of air transport routes. It should not have as its objective the transportation of government traffic, but should move such traffic only as an incident to its training operation.

• **The government** should not utilize the great volume of traffic it controls to exact from carriers concessions which are not available to private travelers or shippers.

• **Government regulatory policy** should permit the air carriers to encourage the development and expansion of air cargo. In this regard, the combined efforts of the military agencies and the commercial carriers should be directed toward the development of efficient cargo aircraft.

• **The federal government** should participate financially with local govern-

NEWS SIDELIGHTS

USAF's Directorate of Flight Safety Research has the funds and personnel to conduct on-the-spot investigations of only 8% of USAF plane crashes, although Brig. Gen. Richard J. O'Keefe, its director, would like to be able to probe about 20% of the accidents. For accidents which it cannot investigate, the directorate must depend on field reports for analysis.

One strong argument proponents of water-based aircraft, such as Convair's XF2Y Sea Dart, are advancing is the advantage of water runways. They point out that it would be extremely difficult to neutralize a water base by air attack. Conventional bombs make no craters in a water runway and radioactive contamination by nuclear bombs last only a short time.

USAF question of what would happen in a forced landing of a B-47 was answered at Oklahoma City recently when one of the Boeing aircraft landed wheels-up in a wheat field. USAF investigators termed it a "very safe" landing. Using the drag chute, the pilot set the aircraft down in the field, slid 1,300 ft. with only minor damage.

Flying Tigers recently used four DC-4s and five C-46s for a day-long airlift of 400 Chinese seamen from San Diego, Calif., to Norfolk, Va. The Chinese Nationalist military crews, who arrived in California by ship, were en route to the East Coast to pick up two U. S. destroyers transferred to the Chiang Kai-Shek government on Formosa under MDAP.

USAF crashes for the greater part of 1953 were at a rate of 24 major accidents per 100,000 flying hours. Rate for 1952 was 29 per 100,000 hours. One accident in every five was fatal.

Why do aircraft engineers change jobs? A recruiter for one of the major airframe plants breaks the job-changers down into three categories: 1. Floaters, the "bored people" who drift from one design section to another for a few dollars more in pay and who are "the type of engineers I have little use for but when the company is desperate, a body is a body"; 2. The job-followers who of necessity move from one company to another as projects are initiated or completed; 3. Skilled personnel who leave a company for other reasons, such as dissatisfaction with management or a desire to work closer to home.

Boeing's B-52 is equipped with Hydro-Aire's Hytrol antiskid braking system. Other aircraft on which the system has been installed include the B-47, B-60, QF-80, F-94B, F9F, C-97, R5D, DC-6B, Avro CF-102, C-54A, C-54B and DC-7.

Brig. Gen. Richard J. O'Keefe, director of USAF's Flight Safety Research Office, believes one of the greatest safety fields open for research lies in attempts to overcome "built-in" windshield obscuration. Some work is underway in that line.

Members of the Engineers and Architects Assn. signed new wage agreements recently at two Southern California aircraft plants calling for 4% pay increases. One contract covers 2,500 employes of Lockheed Aircraft's plants in Burbank, Van Nuys and Palmdale. Another was signed at Convair's Pomona Division.

Fire destroyed the Meletron Corp. plant at Los Angeles Dec. 29 with loss estimated at $500,000. The firm manufactured precision pressure switches and valves for the aircraft industry. The blaze followed an explosion.

Douglas-El Segundo Division has delivered its last F3D Skyknight to Navy.

A French-language group at the University of Southern California pulled a switch on the usual 50th Anniversary of Powered Flight celebration by holding one entirely in French.

Experts say a turborocket engine, combining the best characteristics of a jet and rocket engines, is 3-4 years off. Interim solution is a turbojet plus an auxiliary super-performance engine (possibly a ramjet or rocket).

in the palm of their hand...

AEROTEC AUTOMATIC CONTROLS

Safeguard

the pilot and his plane

...Every major airframe manufacturer in the United States specifies AEROTEC Automatic Controls for at least one of his products. At today's trans-sonic speeds and split-second combat maneuvering, the pilot's very life and the safety of his plane are dependent upon these automatic controls.

Proved in thousands of military and commercial aircraft, AEROTEC Automatic Controls are today being specified by more and more manufacturers. These controls have passed extensive qualification tests *simulating actual flight conditions* in accordance with Spec MIL-E-5272 so that they can offer perfect performance under the most severe flying and combat conditions.

AEROTEC Automatic Controls for flap, landing gear and cabin heater applications, fuel transfer, flow indication, etc., have proved their performance record in flight, and have always given added safety to pilot and plane.

Let our qualified engineering staff help solve your automatic control problems. One of our specialists is near, ready to serve you. Call or write today.

When you think of Automatic Aircraft Controls, you should automatically think of AEROTEC.

Project Engineers

THE THERMIX CORPORATION

GREENWICH, CONNECTICUT

(Offices in all principal aircraft centers)

Canadian Affiliates: T. C. CHOWN, LTD. Montreal 25, Quebec • Toronto 5, Ontario

THE AEROTEC CORPORATION

AIRCRAFT DIVISION GREENWICH, CONNECTICUT

Designers and Manufacturers of Automatic Controls—*Valves:* Regulating, Relief and Check types—*Pressure Switches:* Gage, Altitude, Differential and Absolute Types—*Float Switches:* Top, bottom or side mounted—Single, Dual or Tandem.

ment in the construction and development of those civil airports which are necessary for interstate commerce and the national defense.

• **An immediate and concerted effort** should be made by the federal government to expedite the development of a common civil-military system of air navigation and air traffic control adequate to meet present demands and future requirements.

• **Internationally speaking,** air transport rights should continue to be exchanged through executive bilateral agreements rather than multilateral agreements. The Bermuda-type bilatcial agreement has proved successful and should continue to serve as the standard in future negotiations.

• **The federal government** should encourage the development of new transport aircraft by making longterm financing available to the manufacturing industry. Also, the military should investigate their need for new turbine-powered transport aircraft, since the development of such airplanes will be of substantial indirect benefit to the civil air transport industry.

• **State regulation** of air carriers, both scheduled and nonscheduled, is unwise and unnecessary.

▶ **Changes**—Amendments to the act and additional legislation requested by TAG are:

• Eliminate subsidy payments to domestic trunkline operators.

• Broaden the right of entry into air transportation, so that full benefits of competition can be realized.

• Limit the jurisdiction of Civil Aeronautics Board to the commercial carriage of cargo and to relieve the Board of jurisdiction over operations by government departments.

• Empower and direct the Board to regulate commercial rates in international air transportation.

• Enactment of any legislation which may be necessary to permit the carriage of first-class mail by air, and which may be necessary to permit the lowering of air parcel post costs and charges, so that the full parcel post market could be developed.

Josh Lee Blasts CAB Interchange Decision

Civil Aeronautics Board member Josh Lee wrote a scathing 57-page dissent to the CAB majority opinion denying approval of a voluntary Eastern-Braniff-TWA interchange agreement that would have given southern transcontinental service competitive with that of the American Airlines group (AVIATION WEEK Jan. 4, p. 67).

Says Lee: "This action by the majority which so completely ignores the evidence of the record in this case, re-

. . . CONFIDENCE

Taking off or coming in to land . . . no single item plays a greater part in the safety and comfort of the air-borne than the seat belt. It's a simple uncomplicated device of almost habitual use, but the air traveler appreciates instinctively its added security. The pilot in any type of plane . . . be it airliner or personal plane . . . would no more go aloft without his seat belt than he would think of flying without a compass. A full measure of the character of the product made and distributed by our company is attested by the sheer fact that Air Associates' equipment is standard on over 90% of the world's transport and personal aircraft. Confidence of this dimension is only accorded a product . . . a company . . . whose records of achievement have stood the test of time. Inaugurated in 1927 . . . for more than a quarter century, this company's unsung theme has been literally . . . to make only the finest, to distribute only the best.

"DO MORE BUSINESS . . . MAKE MORE PROFIT WITH AIR ASSOCIATES' EQUIPMENT"

J. E. Ashman
PRESIDENT

AIR ASSOCIATES, INC.

TETERBORO, NEW JERSEY

DIVISIONS: ATLANTA • CHICAGO • DALLAS • GLENDALE • HACKENSACK • MIAMI • ORANGE • TETERBORO

verses the previous findings of the Board approving the agreement, and continues to protect the monopolistic control of air traffic between California, the Southwest and the southeastern areas of the United States.

"This same philosophy was adopted in the original southern service to the West case (Jan. 30, 1951), when the majority, instead of providing competitive service between Texas and California over one of the heaviest traffic segments in the entire country, decided to further strengthen American's noncompetitive route by funneling into it all of the traffic from three separate interchange services," Lee says.

▶ **Rejects Competition**—In a supplemental opinion to that case, the Board previously "overruled the principles set forth in the original decision and once again returned to a policy favoring competition—the policy it had followed almost without exception since 1940," Lee says.

The new (third) majority decision again rejects the competitive philosophy on southern transcontinental interchange, on grounds that there is not enough traffic to make it pay, and it would increase overall subsidies to competitors Continental and Braniff, and Eastern would lose nearly one-third of a million dollars a year.

▶ **Lost Ground**—Lee says: "Braniff is not the only carrier in this case who has suffered at the hands of the previously approved interchange services. Again the majority has failed even to refer to the evidence of record in this case showing that TWA, Braniff and Eastern have lost considerable ground insofar as participation in southern transcontinental traffic is concerned since the board approved the three American (Airlines) interchanges."

Avianca Claims New Air Cargo Record

Avianca, Colombian National Airways, reports it carried more than 200 million lb. of airfreight during 1953, claimed by the carrier as a record unsurpassed by any other airline. Comparing its progress in the past 10 years, Avianca says its 1953 cargo total was 8 million lb.

Last year the airline flew more than 1 million passengers and 4.2 million lb. of mail. Miles flown last year totaled 17 million.

Further expansion is expected this year when Avianca takes delivery on new Lockheed Super Constellations. Founded in 1919 with two aircraft, the airline, a Pan American World Airways affiliate, now operates 70 planes.

AOPA Sets Up Safety Course for Civil Pilots

Aircraft Owners and Pilots Assn. has contracted with the Institute of Aviation of the University of Illinois to devise, test and write a curriculum for a bad-weather life-saving rating for inexperienced civil pilots.

The rating will be given to pilots completing the course.

P&WA Honors Canadian

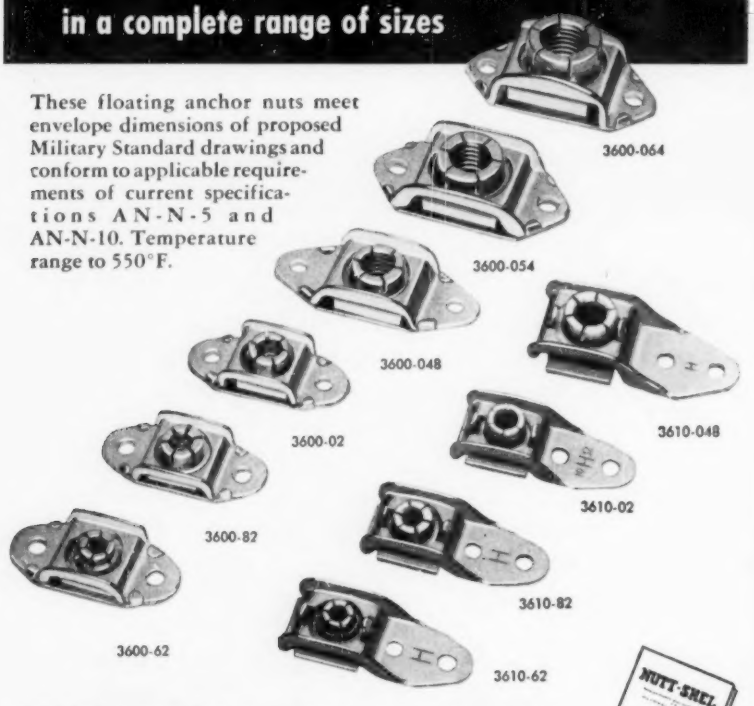
Pioneer Canadian aviation industrialist James Young, left, chairman of Canadian Pratt & Whitney Aircraft Co., Ltd., Lonqueuil, Quebec, receives his 25-year service pin from United Aircraft Corp. chairman Frederick B. Rentschler at the E. Hartford, Conn., offices of the parent firm.

1 and 2 lug *narrow floating*

ANCHOR NUTS

in a complete range of sizes

These floating anchor nuts meet envelope dimensions of proposed Military Standard drawings and conform to applicable requirements of current specifications AN-N-5 and AN-N-10. Temperature range to 550°F.



WRITE FOR SAMPLES. Write on your letterhead for samples and engineering manual. Manual gives dimensions, tolerances and material specifications for these and other self locking anchor nuts and bolts & nut retainers.

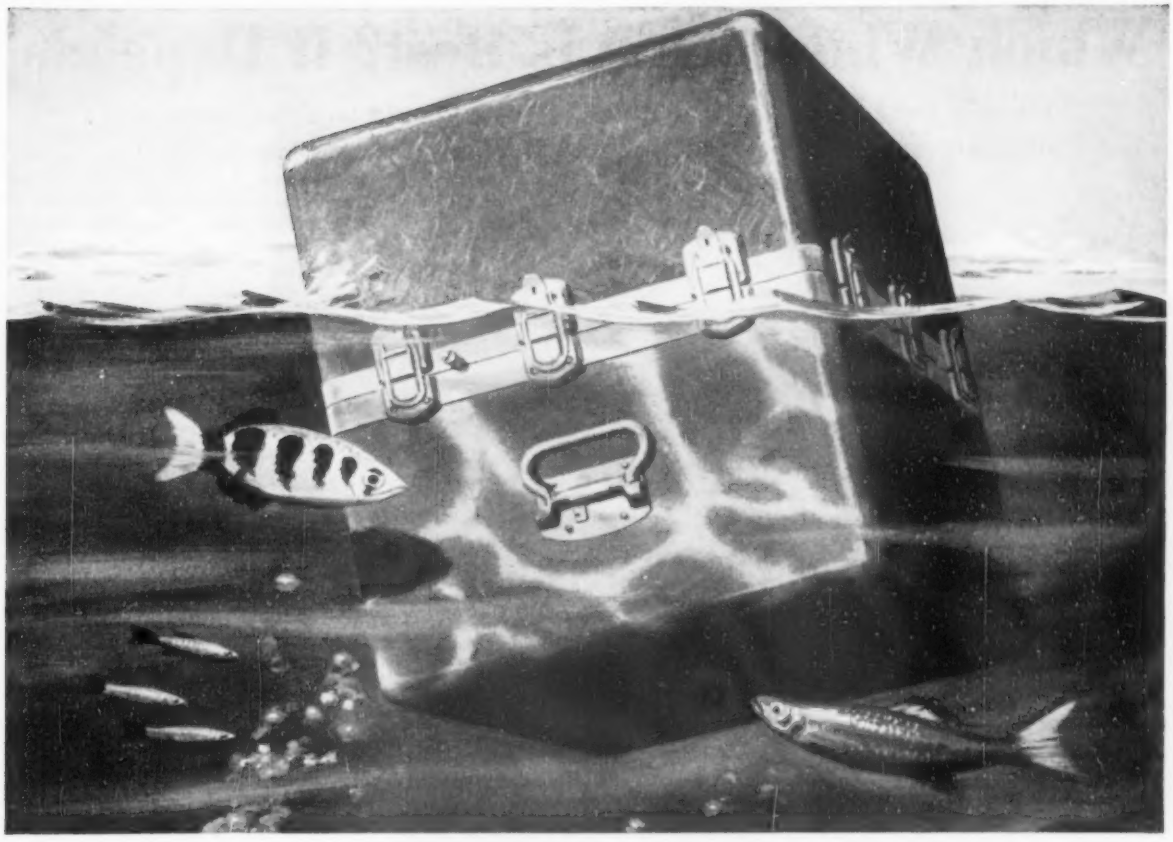
Nutt-Shel

Manufacturers of self locking anchor nuts and bolt and nut retainers.

811 AIRWAY, GLENDALE, CALIFORNIA

CItrus 4-4191 *CHapman 5-3693*

KOCH *Pioneer in Fiberglas reinforced plastics*



Can your shipping cases pass this test?

To protect costly aerial cameras and other precision instruments, the U. S. Air Force has developed a special Fiberglas case, now being manufactured in quantity by Koch of California. (Specification MILC 4150 A-USAF).

In one test, this special case was submerged in 43 feet of water without leaking. In another, the case was dropped by parachute from a plane flying 250 miles an hour at 600 feet altitude (equivalent to a free fall of 25 feet). Both case and contents were undamaged.

Koch Fiberglas cases double as shipping cases, carrying cases and storage cases. No crating or other outer protection is necessary for overseas shipment. Vapor and moisture transmission rate is zero. The cases are fungus and mildew proof. They won't dent—are actually lighter than steel, yet much stronger.

If you manufacture a valuable product that needs this kind of protection, it may pay you to investigate our facilities and experience.

Originator of Koch Fiberglas Luggage— unconditionally guaranteed against breakage on any airline, railroad or steamship, anywhere in the world.

H. KOCH & SONS

Pioneer in Fiberglas reinforced plastics

73 BEALE STREET, SAN FRANCISCO

Which Wing Shape Is Best? It Depends

There's no simple answer to whether form should be delta, swept or straight, says Heinemann of Douglas. Each aircraft is a case by itself.

By William J. Coughlin

El Segundo, Calif.—Edward H. Heinemann, chief engineer of Douglas Aircraft Co.'s El Segundo Division, believes that the delta wing is a fad which has been greatly oversold and that it is not a trend which will dominate the future of piloted aircraft.

Heinemann's appraisal of the delta wing came in a series of interviews with AVIATION WEEK during which the designer of such aircraft as the F4D Skyray and D-558-II Skyrocket outlined his predictions for the next 50 years of powered flight.

▶ **Sees No Trend**—"The successful flights by so-called delta-wing aircraft, both in this country and in England, and of some low-aspect-ratio-wing airplanes approaching the delta planform have led many aviation enthusiasts to believe the handwriting is on the wall and that future aircraft will resemble equilateral triangles or the schoolboy dart-shaped aircraft," the Douglas designer says. "While it would be foolish to predict the future trends at this time, it is still doubtful that the successful flights of some delta aircraft indicate very much of a trend."

Coming as they do amidst growing British enthusiasm for the delta planform and reports of difficulties with Convair's new F-102 delta, Heinemann's remarks take on added significance.

"There has recently been a great deal of talk, concern and misunderstanding about wing planforms, especially with respect to the so-called delta arrangements," he says. "Like any fad, the delta wings have been greatly oversold, misunderstood and misrepresented."

▶ **Key Is Tactical Needs**—Heinemann makes it clear that he is not backing any particular wing planform as the answer to a designer's problems. The desirable wing will depend upon tactical requirements, he points out.

High fuel consumption of present jet engines will have a definite effect on wing design, Heinemann indicates, explaining that fighters of the next generation, even though designed to fight at supersonic speeds, must cruise at subsonic speeds so that fuel consumption does not become a prohibitive factor.

▶ **Supersonic or Subsonic?**—"Do you design an aircraft for the few minutes it must fly at supersonic speed or the two hours it must cruise at subsonic speed?" he asks.

"While it appears that a thin, straight wing may be the best compromise for certain supersonic speeds, it must be remembered that even supersonic airplanes for some time to come must cruise at subsonic speeds. Therefore it may be desirable to favor the subsonic cruise condition, with a slight sacrifice of supersonic performance. Thus it can be seen that the selection cannot be arbitrarily based upon high speed, but depends on many factors."

These factors, Heinemann notes, include maximum and minimum speed requirements, architectural arrangement of airplane, housing of fuel and landing gear, load factor, and many other design requirements. With these, the designer must make the inevitable best compromise and obtain the best combination with the variables, such as wing thickness, aspect ratio, sweep, and taper ratio.

▶ **No Simple Answer**—"There is no simple answer as to whether an aircraft should have a straight, swept, or delta wing," he says. "It depends on the requirements and the ingenuity of the designer in putting together the many possibilities in order to meet the requirements most efficiently."

Heinemann's comments are his answer not only to over-enthusiastic advocates of the delta-wing school but also to such recent expositions on straight-wing design as the SAE paper by Lockheed's Kelly Johnson (AVIATION WEEK Dec. 7, 1953, p. 26).

The Douglas designer makes it plain he believes that fighter requirements for the next few years will favor a swept-wing design, despite certain supersonic disadvantage. But he makes it equally clear that it is the necessity for subsonic cruising that dictates his choice, and not a devotion to the swept wing configuration as such.

▶ **Pilot Not Obsolete**—Heinemann predicts fighter aircraft 25 years from now still will be piloted—thanks to design improvements. Guided missiles will not make the pilot obsolete, he says.

"We can get a great deal more out of the pilot-airplane combination than many people think," Heinemann declares. "By careful design and simplification, we can tailor the airplane so that the human brain can get much more out of it."

Flying, asserts the El Segundo chief engineer, must be instinctive for a pilot. If a flier must face two or three hundred gadgets and dials in his cockpit, he cannot possibly fly by instinct. Designers therefore must cut down gad-

About Heinemann

Edward H. Heinemann, chief engineer of Douglas Aircraft Co.'s El Segundo Division, says there is no single answer to the question: Which is the best wing shape? Each aircraft must be evaluated in terms of its tactical mission. This approach can be illustrated by the various shapes Douglas has put in the air during the 17 years Heinemann has held his El Segundo post. These include the experimental Skyrocket and Skystreak, the F4D Skyray, A3D, A2D Skyshark, F3D Skyknight. Powerplants in Heinemann designs now flying include rocket, jet, turboprop and piston engines.

Heinemann concluded his formal education at 17, but extended his aeronautical knowledge by self-study and practical experience. In 1951 he received the Sylvanus Albert Reed Award for contribution in the field of experimental aeronautics, recognizing his part in creating the Skyrocket. In 1952 he was elected a vice president of the Institute of the Aeronautical Sciences.

gets to the point where flying can become second nature to the pilot.

"Missiles will not replace the pilot in the foreseeable future," Heinemann states.

A new field during the next 50 years of powered flight will be a combination of piloted aircraft and missiles, he predicts.

▶ **The Crystal Ball**—Future aircraft will fall into two major classifications, according to Heinemann:

• **Airborne machines,** achieving aerodynamic lift by flying through the earth's atmosphere.

• **Thrust-borne machines** of limitless speed traveling beyond the earth's atmosphere. For a good portion of their flight, these machines will not need wings because thrust will exceed mass. Greatest problem is how to get them back into the earth's atmosphere without meteor-like burning.

Such tricks as aerial refueling and parasite fighters will be used only on isolated occasions where tactical requirements demand them, Heinemann believes.

"We must build airplanes self-sufficient as our primary objective and resort to such tricks only where necessary," he says.

Engines which will power the two major aircraft classifications listed by the Douglas designer fall into two corresponding groups:

• **Airbreathing powerplants,** mixing air and fuel for burning.

• **Non-airbreathing powerplants,** using fuel and oxidizer for reaction.

"For the next 10 or 20 years, constant development in those two fields is clearly indicated," he states. "The jet will have bypass, preheat and a lot of hybrid developments. Rocket engines will explore all types of new fuels and oxidizers and will no doubt be greatly improved."

▶ **Atomic Engines**—After that will come the transition to nuclear powerplants in both the airbreathing and non-airbreathing fields.

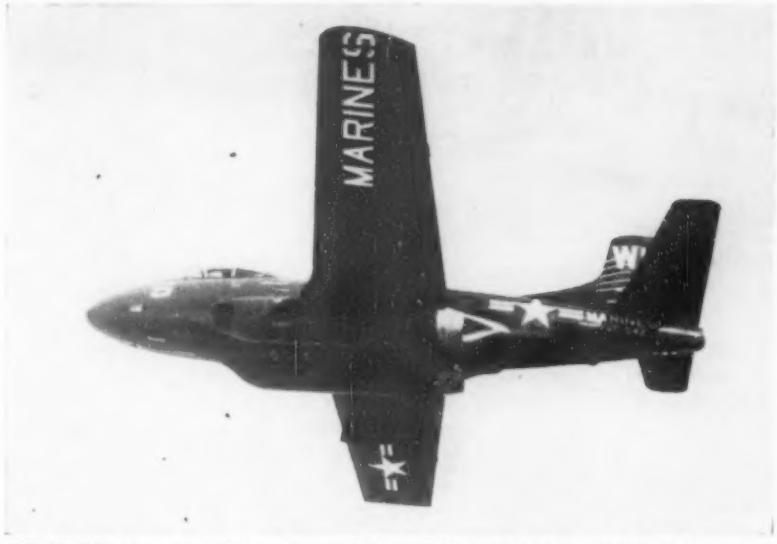
"Right now, we deal in chemistry and when we go to the nuclear field, we switch to physics," Heinemann comments. "Whether there will be a clean break or a wedding of the two, we don't know yet."

"In this field, we move from the comparatively low velocity of chemicals to the high-velocity cosmic energy of the sun and what the future will bring is anyone's guess," says the aircraft engineer.

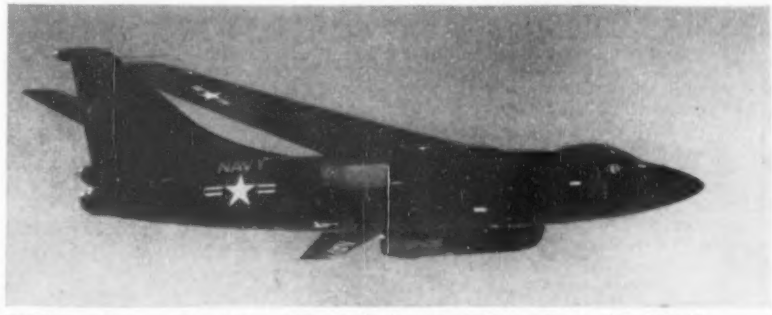
There is every indication atomic power for aircraft not only is possible but practical, he says, but it probably will be another 15-25 years before it is in successful use.

A more exact estimate is difficult, the Douglas designer points out, because atomic energy is such a new field that

Some Douglas Shapes Now Flying . . .



STRAIGHT wing approach is represented by F3D Skyknight, Navy twin-jet fighter.



SWEPT wing is used on Navy A3D attack plane, basically similar to USAF B-66.

MODIFIED swept wing on XF4D-1 Skyray is seen by some as modified delta.

(Advertisement)

Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,

Senior Member, Aviation Writers Assn.

Only so many words can be squeezed into Valve Talk, but in this issue I'd like to devote them to names and groups of people — those who Whittaker engineers feel are deserving of the valve company's appreciation for a variety of reasons.

And before I start, I should like to apologize, for it's impossible to put down all the friends and associates whom Whittaker wishes to commend with a word and a theoretical handshake. But I'm sure you'll understand. It's just that there are so many . . .

To the gang at North American's home plant, then. To **Fred Boeke,** chief power plant engineer. To the engineering group leaders, **Phil Jones, Bob Paselk, Frank Mittel** for outstanding work on the F-100 Super Sabre. To **"Maury" Dubue** and **George Bidwell** in purchasing, and to **John Casey,** chief of field service . . .

To **Bill Warren, Glenn Martin power plant section** and to **Bill Slook of the Fairchild Aircraft Division** and **Pat Mulroney,** manager of materiel; **Kent Bradford,** chief of field service, and **Walt Lamb,** field service rep, in Frankfort, Germany . . .

To **Norm Egloff,** purchasing, and **Jim Connors,** engineering, both of **Grumman.** To **Allison's Al Lange,** production control; **Jim Kelly,** purchasing, and **Jake Schmid,** controls group leader.

To the men of Douglas Santa Monica — Jack McGowan, project engineer on the hotshot DC-7; **Carl Weise** and **Bill Kavasch** in the power plant; **Carl Chambers** in hydraulics and **Bill Reaser** in air conditioning.

Then there's **Bob Doran** and **H. C. Brackney** at Santa Monica; **Harry Hjorth** in military sales; **Jim Ferra** and **Walt Winkler** in field service, **Curt Osman,** too, and **Jim Edwards,** recently returned as a staff engineer . . .

And Boeing Seattle . . . To **Ed Pfafman** on B-47 fuels and hydraulics; **John Fitzpatrick,** staff rep. in the unit test lab; **Howard Stuverude** on the B-52 fuel systems; **Bob Schirkofsky,** fuel and hydraulic expert for the C-97, and **Paul Schumaker,** hydraulics and mechanical topper.

To **Henry Jones, Convair Ft. Worth,** Manager of Materiel; **Ted Smith** of Aero Design; to **Wendell Eldred,** Convair, for hydraulics progress. To **Hank Waring of Cessna.** To **Robbie Robertson and Bill Ferguson of Douglas Tulsa.** To **Don Waller of TEMCO** for work on the Plebe.

Thanks and a handshake also to **Northrop's Warren Collins,** group engineer for the F-89 fuel system, and to **Dick DeGray of Lockheed;** to **Norm Faber,** Lockheed engineer also; to **Carson Hawk and Joe Gabor of Aerojet.** To **Bill Whitesides and John Bloom of Douglas El Segundo.**

To General Electric's Gene Roche, engineering controls group leader, and **Grover Hotaling,** director development materials. **To Lockheed's Marietta buyer, John Turbiville; Ken Harlan,** project engineer at **North American Columbus.** And to **McDonnell's Don Irwin,** hydraulics engineer, and **Bill Becker,** director of procurement . . .

To the gang at Boeing Wichita — Clem Vail, new purchasing agent; **Marion McClung,** his assistant; **Doug Buchan,** buyer; Engineers **Bob Plath** and **Elton Rowley;** and **Tony Chippas** in power plant engineering.

Then there's **Bill Haugh, Chance Vought** Purchasing Agent, and assistant, **Joe Bruno.** Thanks to **Stu Brandt of the Convair San Diego plant** for his ideas on flow proportions and other devices and to **Tom Chadwick** of the same outfit . . .

And **to the Douglas Long Beach gang,** including **Cliff Starr** for his work on "plug-in" fuel valves; to **W. F. Walker,** to **Ernie Walther** and **Tom Wall,** all great guys . . .

To Vic Olson, manager of Air Supply, and **Bill Whitehead,** vice-president of **AiResearch,** for their valuable advice; to **Fred Amon,** recently promoted to vice-president of **Parker Aviation;** to our "Schulein" friends, **Frenchie Foushee** and **Bud Berlinghof of Ryan Aircraft.** To "small man" **Harrison Holzapfel of Western Air Lines** who knows what makes airlines tick . . .

To the wonderful crews at Wright-Patterson AFB, Edwards AFB, Tinker AFB and all the AMA's, to the Navy's BuAir staffers and the Inspector General's office at Norton AFB . . .

To each and every one of you — and to those whom I may have missed — Whittaker's appreciation, commendation and thanks via Valve Talk.

For the valve men I say sincerely to all of you:

"It's been wonderful."

its rate of progress has not yet been established.

Concerning aircraft speed, Heinemann notes that fighter speeds have climbed at an average of 15 mph. a year, over the first 50 years of flight, while transport speed has progressed at roughly 7 mph. per year, or about half that of the fighter. The current generation of fighters is high subsonic.

"Next generation now coming up is supersonic," he says. "They must be or they are not in the running."

► **Heat and Radiation**—The thermal barrier will hold down aircraft speeds as long as present materials are employed, Heinemann predicts. At sea level, critical temperatures will limit continuous operation to between 700 and 800 mph. In the colder atmosphere above 35,000 ft., top speed for continuous operation will be in the neighborhood of 1,200 mph. for these aircraft, according to Heinemann.

"Short bursts at higher speeds will be possible, of course," he says. "But if it becomes necessary to go faster in continuous operation, we will have to go to extremely costly cooling systems for equipment and personnel or go to extremely high altitudes where heating is not a problem."

At high altitudes are encountered such new problems as cosmic radiation; and there, with man pondering the hazards of cosmic radiation in flights above the earth's atmosphere, Heinemann leaves his predictions for the next 50 years of powered flight.

His design philosophy—as applicable for the next 50 years as the last 50—is this:

"You must remember, when you deviate too far from the trend you have to come back again. At Douglas, we cover the extremes but don't go off on fads. When it comes to whether wings should be one way or another, it depends on the job to be done. Progress comes in small steps and soundness of design is more important than being first with an innovation."

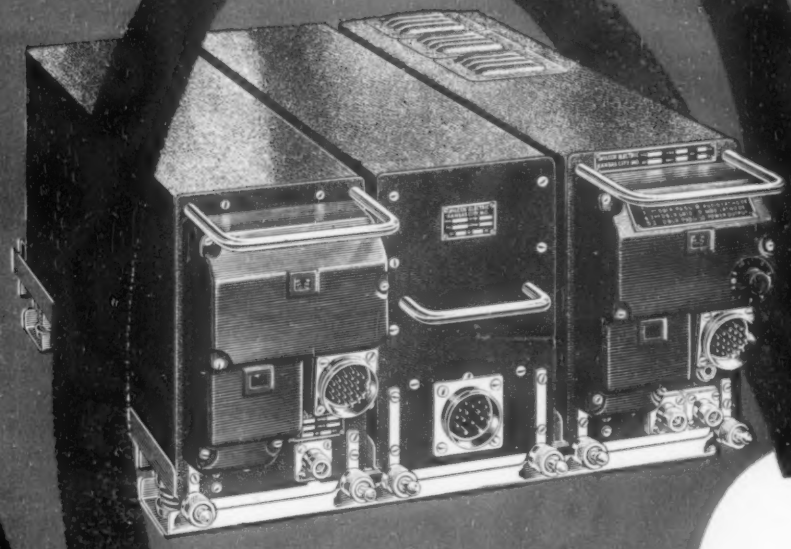
Cornell Windtunnel Reaches Mach 13

Mach numbers as high as 13 have been attained in a new windtunnel recently developed by Cornell Aeronautical Laboratory for Air Force's Arnold Engineering Development Center.

The tunnel is capable of testing up to Mach 20, according to project engineer Abraham Hertzberg.

Temperatures created by friction and shock waves may touch 7,000F, and are high enough to make the airflow completely luminous. Duration of a 10,000-mph. test is about 1/1,000th of a second.

► **Basic Principle**—Power to drive air



Dependable Communications

The New, Improved **wilcox** 440 VHF Airborne System

for Scheduled, Non-Scheduled Airlines and Corporate Aircraft Operators.

- Maximum of performance and reliability built-in from drawing board to production model.
- Covers all 180 channels (118-136 mc/s) assigned to world-wide Civil Aviation — your protection against obsolescence.
- Plane-to-tower attention guaranteed by powerful 50 watt transmitter.
- Highly sensitive, selective receiver provides most readable signal with minimum interference.

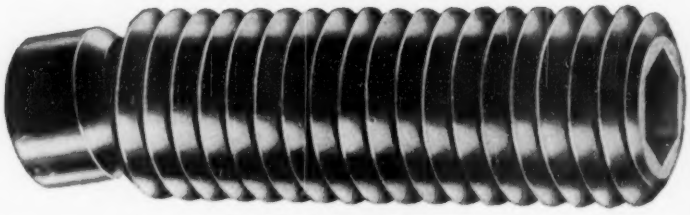
For complete information and specifications, write or call

wilcox
ELECTRIC COMPANY, INC.
Fourteenth & Chestnut
Kansas City 27, Missouri, U.S.A.

Available screw-ball clamp

SAFELY CLAMPS VALUABLE PARTS...AUTOMATICALLY SELF-ALIGNING

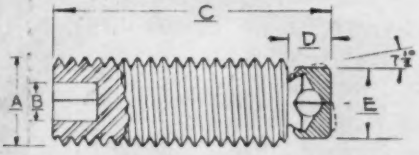
Ball Bearing Construction Insures Frictionless Automatic Angle Adjustment and Rotation



PATENT APPLIED FOR

USE STANDARD HEX KEY FOR WRENCH

SPECIFICATIONS



ITEM NO.	A*	B (HEX)	C	D	E	LOAD LBS.
SC-333	5/16-18	5/32	1	.167	.240	2290
SC-334	5/16-18	5/32	1 ½	.167	.240	2290
SC-335	5/16-18	5/32	2	.167	.240	2290
SC-339	3/8-16	3/16	1	.205	.293	3340
SC-340	3/8-16	3/16	1 ½	.205	.293	3340
SC-341	3/8-16	3/16	2	.205	.293	3340
SC-346	1/2-13	1/4	1 ½	.283	.400	7300
SC-347	1/2-13	1/4	2	.283	.400	7300
SC-351	5/8-11	5/16	2	.326	.506	11700

*ALL THREADS ARE NATIONAL COURSE—CLASS 2 FIT

- **ELIMINATES DAMAGE AND MARRING**...which occurs when the ordinary holding pad is not at 90° to clamped surface.
- **GREATER EFFECTIVE AREA**...The SCREW-BALL CLAMP automatically adjusts itself to distribute uniform pressure on work over entire pad area at all times.
- **ROTATIONAL AND AXIAL FREEDOM**... a highly polished steel ball provides almost frictionless bearing surface for both rotation and oscillation.
- **SINGLE UNIT CONSTRUCTION**... Pad will pass through tapped hole from either end. Saves costly installation time. Ideal for cramped interiors. *Universally adaptable for all types of fixture work.*
- **HEX SOCKET END**...permits full utilization of screw length and minimizes projection interference—uses standard Hex Key for wrench which simplifies pressure adjustments.
- **ECONOMICAL**...screw portion machined from heat-treated alloy steel for long life and high strength. Rust-proofed to prevent deterioration in stock or freezing in fixtures—may be reused again and again. Contact surface of pad is of sufficiently soft material to prevent marring work.

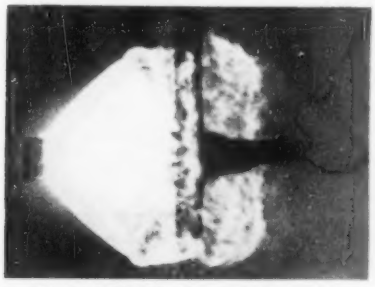
VLIER ENGINEERING
INCORPORATED
4552 BEVERLY BOULEVARD
LOS ANGELES 4, CALIFORNIA

TORQUE THUMB SCREWS • SPRING PLUNGERS • SPRING STOPS • FIXTURE KEYS • TOGGLE PADS

through the tunnel at such hypersonic speeds comes from the explosion of a mixture of helium, oxygen and hydrogen. This type of windtunnel is termed a hypersonic impulse tunnel.

Expansion of the airflow as it enters the test section lowers its temperature to −68F at the same time it increases the velocity of the airflow. Thus, the laboratory says, this tunnel "identically simulates the conditions of real flight in the stratosphere."

The original idea of the project was developed at the laboratory, using Cornell money. The tunnel in its present state was developed under contract with AEDC, Tullahoma, Tenn.



STRONG SHOCK of partial detonation of 8-in. explosive stick is shown in superspeed photograph taken by Hycon camera.

Taking Pictures at 1/10,000,000th Sec.

A camera which features an exposure time of one ten-millionth of a second is in production at Hycon Mfg. Co.

Now being used in ballistic research work at the Aberdeen Proving Grounds of the U.S. Army, the Submicrosecond Camera, as it is called, has been found to have a number of previously unanticipated uses in the study of industrial processes. The observation of jet engine combustion is one possibility.

The unique shutter consists of two screens of polarized material separated by a solution of nitrobenzene. By applying a high electrical potential across the cell, the molecules of nitrobenzene are realigned and light passes through the cell onto the film. There are no moving parts; electrical power requirement is said to be low. Development was under contract with the Ballistics Research Section of APG.

THRUST & DRAG

British bomber classes: Anything under 100,000-lb. gross weight is considered a light bomber. Between 100,000 and 200,000 lb. is the current crop of medium bombers—Avro Vulcan, Vickers Valiant, Handley Page Victor. Over the 200,000-mark is considered a heavy bomber. Ten years ago, the Avro Lancaster, RAF mainstay in massed raids on Germany, weighed 70,000 lb., ready to go.

* * *

"Gather round, comrades, and learn the truth about man's conquest of the air. For years the imperialist Western world has believed the ridiculous claims of two American capitalist manufacturers, but now we can tell you the truth.

"As you all know, we Russians invented the parachute, the flying boat, aviation instruments, all-metal dirigibles, aerial navigation, helicopters, jet propulsion, rockets, radio and radar.

"We also invented the airplane itself.

"The first airplane was built by an engineer—who was naturally a victim of Czarist oppression—in 1881. Mozhaiski—remember his name well, comrades—was a sailor who began experiments with kites one year earlier. Such was the flowering of his genius on the soil of our Mother Russia that one year later he was granted a patent that embodied all the features of contemporary monoplanes.

"In Mozhaiski's patent he showed a fuselage, two fixed wings, an elevator, rudder, a large front propeller with two smaller propellers used differentially to assist steering, and an undercart. Furthermore, the genius of this man also

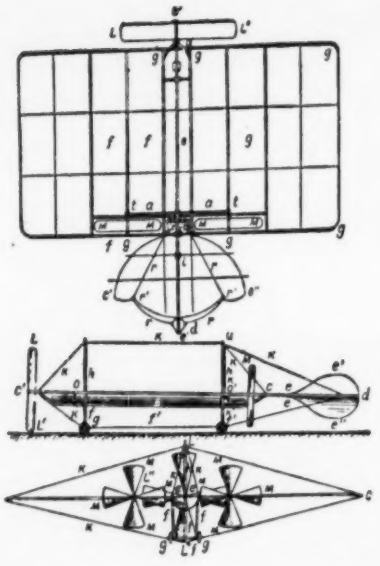
AMERICA'S AIRCRAFT GUARD THE PEACE
WITH **PASTUSHIN TANKS**

Added range for our combat planes means striking deeper behind enemy lines — hitting where it hurts. Pastushin jettisonable fuel tanks, lighter, stronger — the product of long and specialized experience — give our military planes added efficiency in combat or in patrolling America's Air Frontiers.

RESEARCH • DESIGN • DEVELOPMENT • PRODUCTION

Unusual opportunities in research, design and development for engineers! Submit resume of qualifications and experience.

PASTUSHIN AVIATION CORPORATION
LOS ANGELES INTERNATIONAL AIRPORT, LOS ANGELES, CALIF.



produced his own engine, which ran on steam—you will remember that we had not yet invented gasoline—and developed 30 hp. for a weight of only 330 lb., truly a remarkable achievement.

"Only now can the work of this great pioneer be revealed, comrades! We have the full right in being proud of this mightly Russian achievement, and on this 72nd anniversary of powered flight, we can say to the world that the airplane is a Russian invention. Glory to Mother Russia! Glory to Malenkov!"

This tragi-comedy is, of course, not entirely a direct quote from some instructor in the Red Air Force. But large parts of it are direct translations of a biography of Nicholas Jukovski, the founder of Russian aviation. The book was published by the Russian war department recently, and is a propaganda book designed for conscripts and young members of the Red Air Force.

The book is discouragingly brief on the actual flight. The plane took off (says the text), flew some distance and crashed on landing, breaking the wing. This mishap so annoyed the officials witnessing the demonstration that the machine was destroyed and all reports of the trials were suppressed. (Czarist tools!)

But one copy was filed in the Leningrad archives and was hidden there until its recent discovery. In Britain, a hunt through the British Patent Office and an index of Russian patents published in 1884 uncovered an entry by "Captain, first rank, Alexandru Mozhayskomu."

There was no specification accompanying the entry, so the accuracy of the alleged patent drawing can't be checked. The Russian book presents the above drawing as the design.

Think it'll fly? —DAA

Space Experts Outline Targets

By David A. Anderton

"Let's nail up the worthy target of space flight and all throw stones at it together," said Dr. Richard W. Porter, chief of General Electric's guided missile department, at the space flight symposium of the American Rocket Society recently.

Porter's suggested alternative to "throwing stones at each other" seemed to sound the keynote of the symposium, which also served indirectly to outline the Society's policy on this controversial subject.

A panel of 11 experts from the Society, with president-elect Andrew G. Haley as moderator, presented its collective views on space travel at the eighth annual convention of ARS in New York.

▶ **Minority Report**—But not everyone agreed with the policy. Dr. Wernher von Braun, former director of the German rocket experimental station at Peenemuende and now technical director of Army Ordnance guided missile work at Redstone Arsenal, Huntsville, Ala., criticized what he called the "lukewarm attitude of the Society."

Von Braun's defense of his own concepts of wheel-like satellites in lazy orbits above the earth constituted the only minority report during the discussion. His arguments for a coordinated space flight program, presented at the very end of the symposium, without benefit of subsequent discussion from the floor, emphasized the often-denied split in the Society between the proponents of starting now on space flight and those who believe it will come along naturally as an outgrowth of progress in the missile programs.

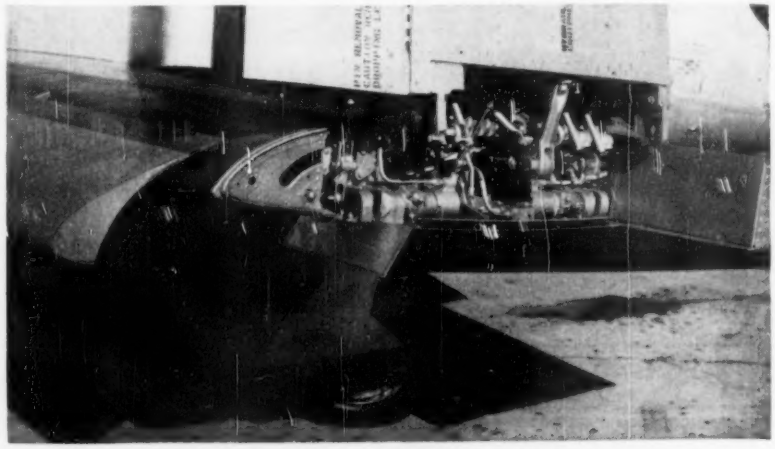
▶ **Rocket Experts**—The panel included: Kraft A. Ehricke, former associate of von Braun at Peenemuende and Redstone Arsenal, now with Bell Aircraft Corp.; Col. J. H. DeWitt, former Bell Telephone Laboratories staff engineer, now president of WSM and WSM-TV, Nashville; E. E. Francisco, Jr., chief of the propulsion branch, White Sands Proving Ground; Darrell C. Romick, aerophysicist at Goodyear Aircraft; Milton W. Rosen, staff member of Naval Research Laboratory in charge of high-altitude rocket research; Kurt Stehling, former rocket engineer with Bell, now research associate in jet propulsion at Forrestal Research Center, Princeton University.

Also on the panel were: A. R. Tocco, technical staff of Hughes Aircraft Co.'s Guided Missile Division; Dr. Paul F. Winternitz, former director of research for Reaction Motors, Inc., now at New York University in propellant research; Cmdr. R. C. Truax, in charge of surface-launched guided missiles for Navy's Bureau of Aeronautics; Dr. R. W. Porter, General Electric Co., and Dr. John R. Pierce, director of electronic research, Bell Telephone Laboratories.

New Approaches

Ehricke led off with a discussion of the problems of supplying a satellite and the optimization of orbits for interplanetary flight.

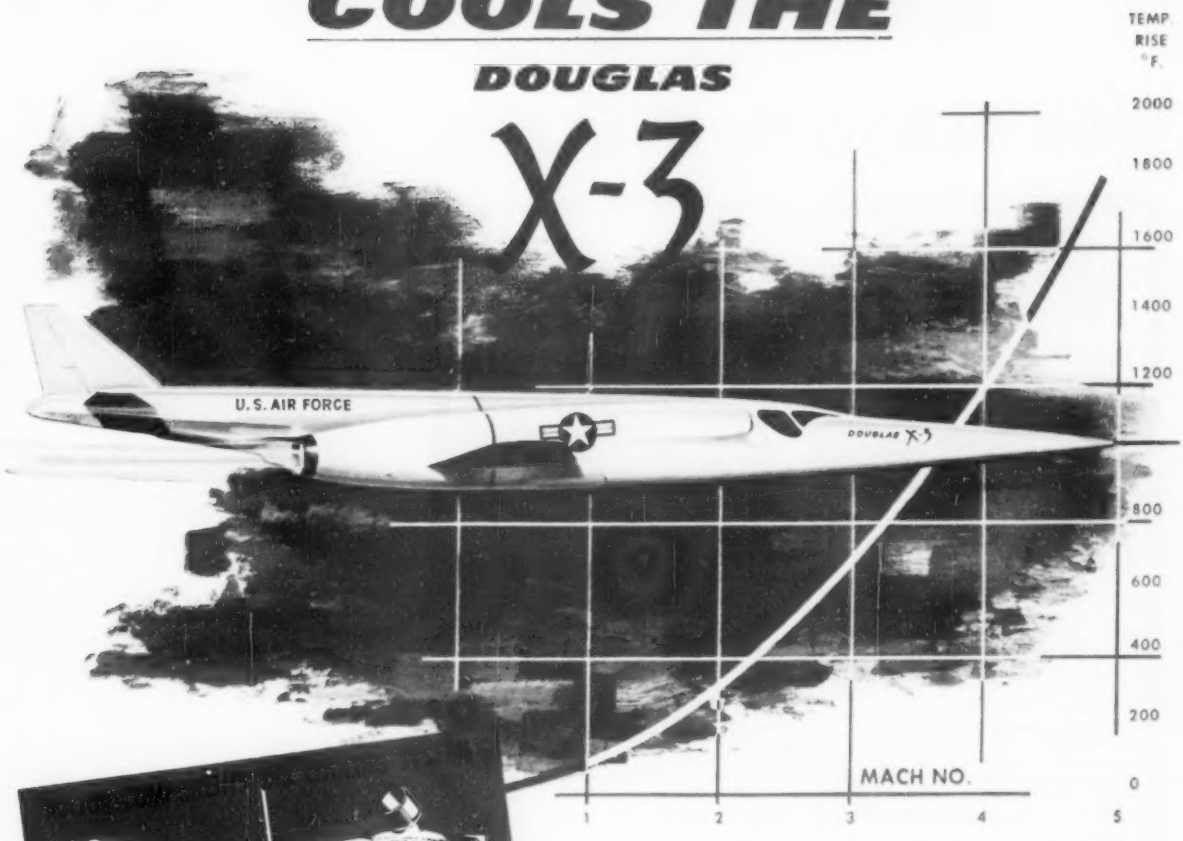
He advocated the use of automatic freighters to separate materials from passengers in supply runs. Such auto-

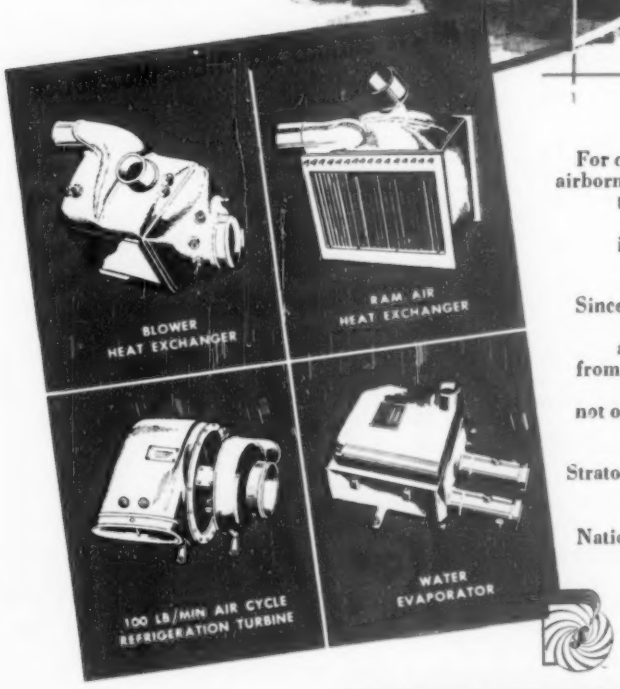


How the Fury Folds its Wings

Closeup view of the wing folding mechanism of this North American FJ-2 Fury, U. S. Marine Corps counterpart of the USAF'S F-86 Sabre, provides an insight into the engineering required to convert a land-based fighter to carrier duties. Note the numerous forgings used. Folding and unfolding action is hydraulically controlled.

STRATOS COOLS THE DOUGLAS X-3





For cooling the Douglas X-3, Stratos built the highest capacity airborne refrigeration system ever made and designed it to meet the severest requirements yet imposed by high speed flight. It is the first to use an evaporator in conjunction with an air cycle refrigeration turbine to create a compact, reliable system.

Since the X-3 flies for sustained periods at high Mach numbers it will be the first to explore problems arising from the high ambient temperatures which result from ram rise. Refrigeration is, therefore, of critical importance. The Stratos system is required to cool not only the pilot but much of the equipment and many of the compartments in this research airplane.

Stratos is proud to have been called on to design and produce equipment for this radical new research airplane built under the joint sponsorship of the Air Force, the National Advisory Committee for Aeronautics and the Navy.

PRINCIPAL STRATOS PRODUCTS: *Jet Bleed Refrigeration Packages • Air Turbine Drives • Pneumatic Controls • Air-Moisture Separators • Cabin Superchargers • Bootstrap Refrigeration Units Mass Flow Valves • Emergency Disconnects*

STRATOS

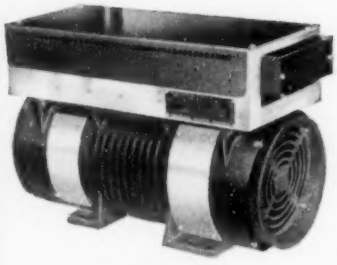
STRATOS HAS GOOD OPENINGS FOR ENGINEERS · SEND RESUMES

A DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORP.

Main Office: Bay Shore, L. I., N. Y. • West Coast Office: 1355 Westwood Blvd., Los Angeles, Calif.

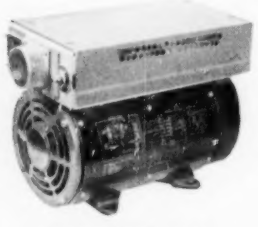
Bendix
Red Bank

HIGH ALTITUDE INVERTERS



Type 32E03-3

Bendix Red Bank 32E03-3 and MG-54 Inverters give the continuous full AC power output needed to operate flight control instruments, radio communications and radar at today's higher altitudes and ambient temperatures. These two high altitude champions make the customary de-rating at higher altitudes unnecessary. They can deliver this outstanding performance because they have been specifically designed for high altitude operation and are not simply modernized versions of older designs. Further, their integral voltage and frequency controls enable them to hold the close tolerances required in modern aircraft.



Type MG-54

Specifications
Type 32E03-3
(Conforms to USAF drawing 53B6227 and AN-I-10b)

Input DC	
Voltage Range	26 to 29
Current Range	160 to 180
Current at 27.5 volts	165
Output AC	**Single Phase**
Volts	115±4%
Amperes	21.7
Volt-Amperes	2500
Frequency-cps.	400±10
Power Factor	.9 lag to .95 lead
Efficiency	55%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 62 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 7¼" wide x 11¼" high x 17" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
35,000 ft.	−55°C to +40°C
50,000 ft.	−55°C to +20°C

Type MG-54
(Conforms to Navy drawing E-51A1A9 and MIL-I-7032)

Input DC	
Voltage Range	26 to 29
Current Range	24.1 to 21.6
Current at 27.5 volts	22.8
Output AC	**Three Phase**
Volts	115/200±4% (115±4%, single phase)
Amperes	1.25/.723 /2.17, single phase)
Volt-Amperes	250 (single phase, three phase, or single and three phase combined)
Frequency-cycles/sec.	400±10
Power Factor	0.8 lag to .95 lead
Watts at 0.8 PF lag	200
Efficiency	40%
200% load	5 sec.
150% load	5 min.

WEIGHT: Approximately 17 pounds.

MAXIMUM OVER-ALL DIMENSIONS: 5½" wide x 8" high x 12" long.

ALTITUDE	AMBIENT TEMP. RANGE
Sea Level	−55°C to +85°C
50,000 ft.	−55°C to −10°C
65,000 ft.	−55°C to −10°C

Manufacturers of Special-Purpose Electron Tubes, Inverters, Dynamotors and Fractional HP D.C. Motors.

Bendix
Red Bank
EATONTOWN, N. J.

DIVISION OF

THE NAME Bendix AVIATION CORPORATION MILLIONS TRUST

West Coast Sales and Service: 117 E. Providencia, Burbank, Calif.
Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

matic rocket ships would be able to eliminate equipment needed to sustain human life, and thus could be designed more functionally as freight-carriers.

► **Typical Design**—A typical three-stage vehicle design would stand 126 ft. high and be powered by a liquid oxygen-hydrazine rocket engine. Payload would be approximately 11,000 lb. A five-passenger space ship to make the same trip with a 1,200-lb. payload (presumably passengers plus pilot) also would be a three-stage layout, standing 130 ft. high and weighing in at 1,340,000 lb.

A supply ship could be designed, said Ehricke, to carry 2,000 lb. of supplies at a gross weight of only 275,000 lb. These figures served to point up the tremendous weight penalty paid in take-o ffweight for each pound of payload in the last or third stage.

Ehricke's analysis indicated that his advocated system of unmanned supply rockets would have an overall efficiency about nine times that of manned vehicles doing the same kind of work.

► **Step-by-Step**—Col. DeWitt said he believes not enough work is being done with transmission of radio waves through the earth's atmosphere.

Francisco's views were that space flight will be realized only long and tedious work on a step-by-step basis. Presumably as a result of his practical experience at WSPG, he accented reliability in any such program, not development.

► **Envisioned Controls**—Control system problems for space ships were roughed out by Darrell Romick. He defined four types of currently envisioned systems for control:

- **Preset programmer** (basically a timing device).
- **Inertial system**, similar to present-day automatic pilots.
- **Radar-doppler systems**, using the comparison of transmitted and received frequencies to measure velocity.
- **Ground monitoring** by radar or other means.

Romick emphasized reliability, pointing out that it would not be possible to throw out an anchor or pull over to the side of the highway while figuring out what is wrong.

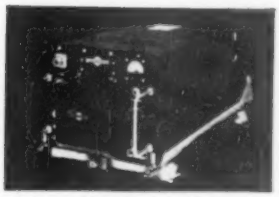
He said there were two possible alternatives to functional failures of automatic equipment that had been proven in countless numbers of contemporary airplane flight tests: either you provided an alternate system, or you provided a manual override for the pilot.

► **Fourfold Function**—Control systems for space ships would have four basic design functions, Romick said:

- **Correction of motion** at takeoff.
- **Correction of errors** accumulated during flight.
- **Landings in an airless environment**, such as the Moon.
- **Landings in a usable atmosphere**, ex-

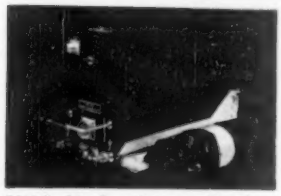
complete COLLINS VHF, Omni, ILS

in ONE PACKAGE installation



17M-1 VHF Transmitter — 50 kc channel spacing, 360 channels. Excellent stability.

51X VHF Communications Receiver — Companion to the 17M-1 Transmitter.



51Z-1 Marker Beacon Receiver —Crystal controlled superheterodyne. 327A-1 Indicator shown.

Collins 37R-1 Omni Directional VHF Antenna
37J VHF Navigation Antenna
37P-2 Glide Slope Antenna

51V-2 Glide Slope Receiver — Developed expressly for airlines. Premium dependability.

Collins New Integrated Flight System — Greatly simplifies instrument flying.

51R-3 Navigation Receiver — The standard for Omni, ILS and VHF communications.

New convenience and operating economy for Airlines and Corporations

You can forget the time and cost consuming problems of coordinating different makes of avionic equipment when you put in an *all-Collins* installation. Collins ILS, Omni and VHF equipment is designed with interchangeable component parts, shock mounts and plug-ins. *Maintenance, service and testing are greatly simplified.*

In design, reliability and performance Collins is recognized as the standard! Whether you're installing new equipment or replacing obsolete equipment in your present aircraft, put the advantages of a unified Collins package installation to work for you. Contact your nearest Collins Aviation Equipment Dealer.

FIRST in service to aviation . . .

COLLINS RADIO COMPANY

Cedar Rapids, Iowa

11 W. 42nd St.
NEW YORK 36

1930 Hi-Line Drive
DALLAS 2

2700 W. Olive Ave.
BURBANK

Specialists in Industrial Cleaning Products

R. C. Morgan, Southern California Aircraft Corporation, using SPRAZEE *— note how* SPRAZEE *has blistered the paint — making it easy to flush off.*

Need a good paint stripper? Try Wyandotte SPRAZEE

Mr. Earl Martin, foreman, Southern California Aircraft Corporation, has this to say about Wyandotte SPRAZEE: "We have found that SPRAZEE is a fast-acting, free-rinsing paint stripper, easy to apply by spray or brush. It works very well even in cool or foggy weather, and usually one application is enough."

Wyandotte SPRAZEE is effective, easy to apply and use, economical. It meets government requirements for use on military aircraft.

Wyandotte offers many other specialized products to the aircraft industry. Included are aluminum cleaners and brighteners, steam cleaning compounds, tank desealants, emulsion cleaners, electrocleaners, water wash spray booth compounds, oil and grease absorbents. All these products are backed by Wyandotte's long experience in metal cleaning and related fields.

Call in your Wyandotte representative to help you with *any* cleaning problems. *Wyandotte Chemicals Corp., Wyandotte, Michigan. Also Los Angeles 12, California.*

CLEANING THE WORLD

Largest manufacturers of specialized cleaning products for business and industry

Wyandotte CHEMICALS

Helpful service representatives in 158 cities in the U. S. and Canada

pected to be encountered on many planets.

Romick said he believes a spaceship could miss its final orbit by something like 50 to 100 mi. without serious consequences, providing it was not expected to rendezvous. If it had to meet another ship or establish a precise orbit, then he felt it could be done with single impulse corrections at the points of intersections between arrival and final orbits.

The control system to do the job would be a preset programmer, augmented by one of the systems named earlier, and with manual monitoring.

▶ **Mistakes**—Milton Rosen said most space flight proposals have overlooked the margin of error.

As an example, he said the Martin-built Viking rounds 5, 7 and 9 were the best flights, but all missed their optimum altitudes by several miles. Propellants left in the rocket to correspond to altitude loss were estimated to be 2½%.

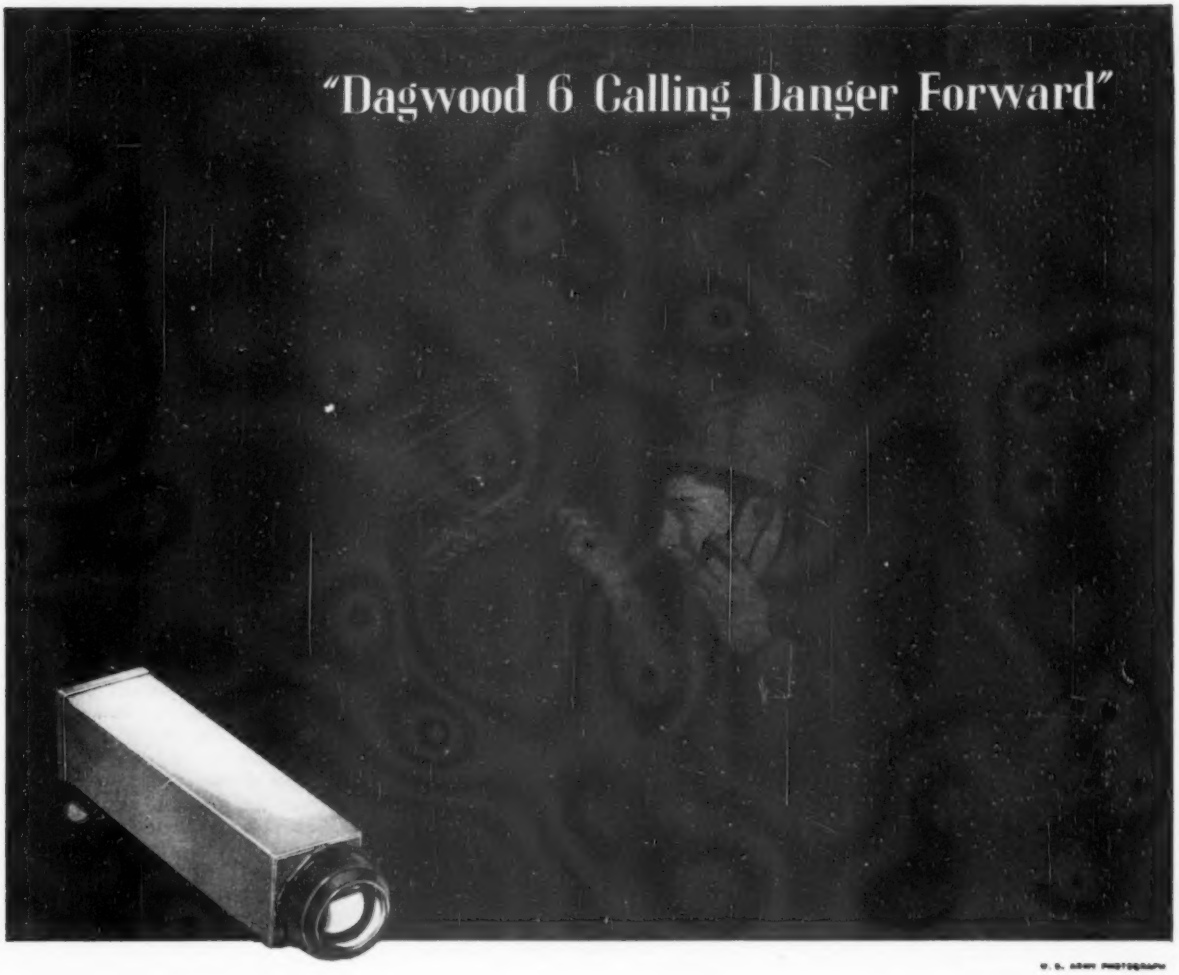
Rosen applied the same "outage" of propellants to three satellite rocket proposals and calculated the resulting margin of error.

• **Satellite A** was to establish a 100-lb. payload in a 200-mi.-high orbit. With 2½% propellants remaining unused, the orbital speed would be missed by 800 fps., and no orbit could be established.

• **Satellite B** was a proposal to place 220 lb. in a 500-mi. orbit using a three-stage vehicle. With 2½% outage, there would be a final velocity loss of 1,500 at 200 to 300 mi. instead of the desired value of 500.

• **Satellite C**, presumably von Braun's project, called for an orbit at 1,075 mi. with a 36-ton payload. Actual propellant weight outage was calculated as 151 tons, and the final velocity would

Lockheed Aircraft Corp.



U. S. ARMY PHOTOGRAPH

G.I. Joe now puts his calls through a new field switchboard twice the capacity and one-third the size of the one toted by his World War II counterpart.

The new "board" has a constitution that can winter in Rejkjavik, summer in Mombasa, and roll with a punch . . . just in case travel gets rough. Its retractable cords know when to come in out of the rain and goo.

Among the many essential parts of this instrument there is one named simply "SIGNAL, switchboard." It is a luminous-painted signal, operated by an electro-magnet, which "drops" into view when a line is calling. There's one "drop" for each telephone cord circuit; each drop is enclosed in a square housing made from Superior Hard Drawn Carbon Steel AISI C1008—.6815" I.D. Square, .020" wall, 2.656" long. Tolerances are close—±.005" on the length and +.007",—.000" on width.

Mr. Lloyd Bender, Vice President of The North Electric Manufacturing Company, makers of the switchboard, says of Superior, "Your performance has been excellent—in workmanship, quality of material and delivery."

Are you looking for a good small-tubing source—one that gives you the widest choice of tubing analyses available in America today, one that can supply you with one or one-million feet, one known for its uniformly high quality, and its interest in you and your tube problems? Try Superior. Superior Tube Company, 2040 Germantown Ave., Norristown, Pa.

Round and Shaped Tubing available in Carbon, Alloy, and Stainless Steels, Nickel Alloys, Beryllium Copper, and Titanium

Superior

THE BIG NAME IN SMALL TUBING

West Coast: Pacific Tube Company, 5710 Smithway St., Los Angeles 22, Calif. UNderhill 0-1331

All analyses .010" to ⅜" O.D.
Certain analyses in Light Walls up to 2⅛" O.D.

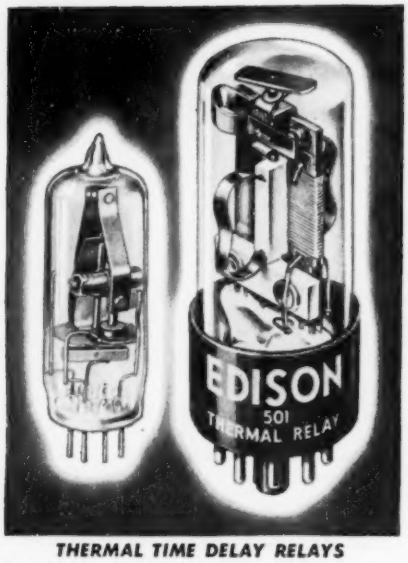
YOU CAN ALWAYS RELY ON EDISON COMPONENTS

for Electronic and Communications Equipment Because of:

HERMETICAL SEALING in rigid glass.

TAMPER-PROOF stability that defies time and abuse.

ACCURACY. Patented feature permits calibration *after* sealing.



THERMAL TIME DELAY RELAYS

Cathode and filament protection • Gyro Erection • Prevent surges and false starts in sensitive auxiliary equipment • Miscellaneous circuit switching

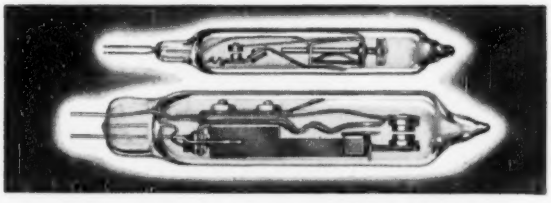
SPECIFICATIONS

Standard Octal Base

Delays . . . 2 seconds to 5 minutes
Heater . . . 5 watts nominal, continuous operation
Voltages: 6.3, 26.5 and 117
Contacts . . . 6 amps maximum, 3 amps to 450 volts a.c. or d.c.
Vibration . . . 1/16" amplitude at 55 cps. 50g shock.
Ambient . . . −60 to +85°C **Seated Height** . . . 3¼ max.

Miniature 7-Pin Base

Delays . . . 5 seconds to 75 seconds
Heater . . . 2.5 watts nominal, continuous operation
Voltages: 6.3 and 27.5
Contacts . . . 2.5 amps max. 1 amp at 125 volts d.c.
Vibration . . . 1/16" amplitude at 55 cps. 50g shock.
Ambient . . . −60 to +85°C **Seated Height** . . . 2¼ max.



SEALED THERMOSTATS

Ambient protection for frequency standards • Precision heat control for electronic laboratory instruments • Overheat detection and fire alarm

SPECIFICATIONS

Heavy duty—type D8

Max. temp. . . . 320°C
Max. watts . . . 1000
Max. amps. . . . 8.0 d.c.
Calibration tolerance . . . ±2.5°C
Length, 2¾"; **dia.,** 9/16" (approx.)

Precision control—type S1

Max. temp. . . . 190°C
Max. watts . . . 150
Max. amps 1.0
Control differential at ¼ amp = 0.1°F
Length, 2½"; **dia.,** ⅜" (approx.)

Write for free bulletins and application data to:

Thomas A Edison
INCORPORATED
Instrument Division
DEPT. 49, WEST ORANGE, NEW JERSEY

YOU CAN ALWAYS RELY ON EDISON

be reduced by 1,200 fps. The satellite orbit would be re-established at only 500 mi. high instead of the desired figure of 1,075.

► **Radiation Hazards**—Radiation shielding of a space vehicle is going to present some tough problems. "How can we protect a crew against all that nuclear garbage whizzing through the atmosphere?" asked Kurt Stehling.

As one case, he cited a five-ton vehicle at 1,000 mi. from the earth. The water needed to shield the occupants would outweigh the vehicle itself by several times.

As an alternative, you could expose persons to radiation for short periods, said Stehling, because that is one of the current practices in working with these kinds of materials. Subsequent rest provides necessary rehabilitation of body tissue.

One often-suggested solution is the use of an electromagnetic or electrostatic shield for deflecting secondary particles. (Secondary particles result from collision of primary radiation with other molecules.) Stehling explained that to generate such a shield would require a tremendous source of electrical energy, and wondered how it could be provided in the limited space and weight available.

► **Clearance Problems**—Security bothered two of the speakers. Tocco's paper had been prepared on new alloys but could not be cleared in time for the presentation. He said that, as an alternate, an argument against a coordinated space program had been prepared, but he chose to speak about metallurgical problems instead.

Tocco said recent progress on ceramic liners and coatings had resulted in developing those materials to resist thermal shock, a quality lacking until several months ago.

Security also prevented Dr. Winternitz from speaking on propellant developments.

► **Space Flight Economies**—"Let's look at the economics of these projects," suggested Cmdr. Truax. He used the basic data from von Braun's "Mars project" to compare cost figures for a winged, recoverable third-stage vehicle to a ballistic, non-recoverable vehicle.

Weight chargeable to items for the return trip was added to the payload of the non-recoverable vehicle, and the payload thus increased from 77,000 lb. to 111,000 lb.

Breakeven point for the winged vehicle was 32 flights; for any lesser number, the economic scales were weighted in favor of the non-recoverable type.

For the most favorable expendable vehicle, it would cost about $162 to place one pound of payload in an orbit, compared to $228 per lb. for the most-favorable non-expendable vehicle.

Truax concluded that the expendable

third stage was the way to do the job.

ARS Philosophy

Dr. Porter presented the Society's policy in favor of space flight and of acting as a catalyst for space travel. He asked the classic question of why there should be space travel.

"Some justify it on the grounds of military reasons and suggest a satellite, like a modern Jove spewing out atomic missiles instead of thunderbolts," he said. "But I believe the main reason will be that which has prompted men to explore since the beginning of time. We want to go just to find out what's there."

Porter, who has the stature of an elder statesman in the Society although still a young man, then delivered his pointed comments about throwing stones together instead of at each other. Audience applause interrupted him, for the only time during the symposium.

▶ **Communcations**—Talking with an outbound spaceship will not be very difficult, according to Dr. Pierce. Problems of transmission through the entire ocean of air above the earth are equivalent to the problems of transmitting over a five-mile distance along the surface of the earth, he said.

Pierce, main speaker of the symposium, told some of the possible means of communication between the earth, a satellite and a spaceship. Using a 3-cm. wavelength, radar tracking would work out to about one million miles before the signal would be lost in noise.

If you wanted to talk to the spaceship, you could use radiotelephone out to about 80 million miles. The antenna required on the spaceship would be about 10 ft. diameter, and that on earth, about 50 ft.

Pierce said it should be possible to communicate with the star Alpha Centauri by microwave before spaceships travel the comparatively small distance to Mars.

Most of the problems of communication, he said, are earthbound ones.

▶ **Satellite Concept**—After a brief question period, von Braun was asked to comment. First stating his disappointment in the attitude of ARS, von Braun pleaded again for the concept of the coordinated space program that must, he said, start now with small beginnings.

"Suppose you had asked a nuclear physicist in 1938: "When do you think you can have an atomic bomb?' What would his answer have been?" he asked.

Then von Braun predicted: "I believe that if we had to, we could put a satellite into an orbit in 10 years."

Commented one observer: "Why not? He did it with the V-2 and surprised everybody."

Up here....
"GOOD ENOUGH".... ISN'T
Only the best in
electronic control systems—
means SERVOmechaNISMS INC.
"PACKAGED FUNCTIONAL COMPONENTS"
Electronic control devices are the very heart and brains of military aircraft. Reliability and ease of maintenance are paramount. Servomechanisms Inc. designs these qualities into all its products.
SERVOmechaNISMS INC.
PACKAGED FUNCTIONAL COMPONENTS
Be sure to visit us at the New York IRE Show. Booth 740-742
Designed and Produced
In divisions at El Segundo, Calif.
and Westbury, New York.

AVIONICS

Design of complex avionics systems draws heavily on specialized know-how from each member of an engineering team such as this group at Minneapolis-Honeywell Regulator Co.

*Avionics provides the eyes, the brain and the muscle for modern military and commercial aircraft. It accounts for 33 per cent of the cost of military planes and amounts to 75 per cent of the price of guided missiles.

Because of Avionics growing use, engineers must seek ways to make equipment smaller, lighter, capable of withstanding extreme temperatures of heat and cold, and most of all make Avionics unfailing. For these Engineers, AVIATION WEEK is the most trusted and dependable source of information on latest developments in the Avionics field because it is the only magazine that regularly reports on this highly complex and specialized subject.

They trust AVIATION WEEK

It's the same with men outside of Avionics . . . important people in Research, Management, Engineering, Production and Maintenance, Scientists, Military Experts and Aviation Specialists of the Services find AVIATION WEEK their indispensable source of Aviation Intelligence. They know that only through world-wide editorial resources . . . reinforced by the largest and most experienced full-time editorial staff in our Industry . . . can their information needs be supplied. They know also that only through a weekly publishing schedule can they keep pace with the Industry's startling developments.

If you need information on the sales opportunities of this multi-billion dollar market get in touch with your nearest AVIATION WEEK representative.

Look to the Sky for your Market.

AVIATION WEEK

A McGRAW-HILL PUBLICATION—ABC • ABP

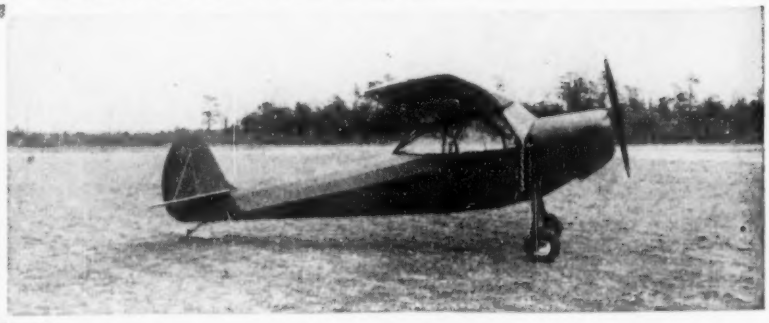
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42 STREET, NEW YORK 36, N. Y.

Other Advertising Sales Offices: Atlanta, Ga.; Boston, Mass.; Chicago, Ill.; Cleveland, Ohio; Dallas, Tex.; Detroit, Mich.; London, Eng.; Los Angeles, Calif.; Pittsburgh, Pa.; Philadelphia, Pa.; San Francisco, Calif.; St. Louis, Mo.

**Electronic and Electrical Equipment used in Aviation*

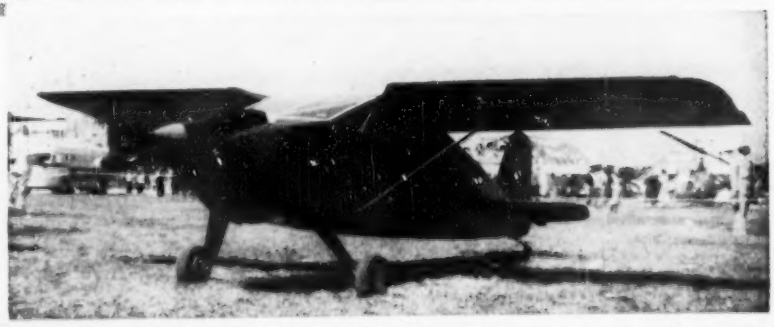
New Lightplanes Make Debuts

FULTON FA-3 AIRPHIBIAN two-place roadable plane is powered by a 160-hp. Franklin engine and features numerous improvements over earlier models, notably cantilever wings. Outrigger wheels, which support wings when detached, retract into wings. They were fixed in previous types.

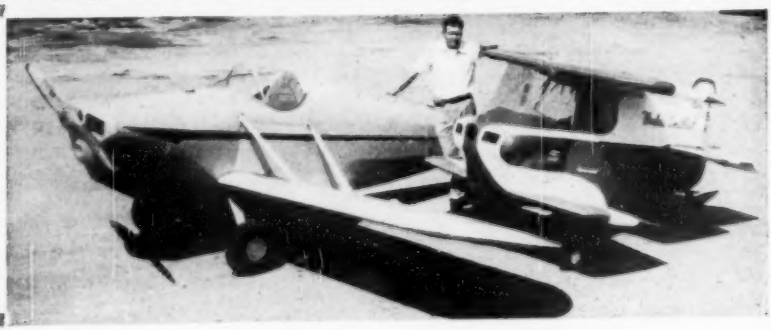


SUPER DART single-seater has been designed and built by Jack McRae, Grumman stress analyst. Powered by a 55-hp. Lycoming, the plane spans 27 ft. 6 in., has a gross weight of 750 lb. Top speed is 125 mph. and range on 10 gallons is 300 mi. Single-strut landing gear was built by Cessna.

NELSON N-4 midwing constructed by Ray Nelson has an 85-hp. Continental, has 118-mph. top speed. Utilizing numerous Piper Cub components, the N-4 weighs 1,200 lb. and spans 24 ft. 9 in. A 25-gal. fuel tank provides four-hour endurance. Takeoff distance is only 400 ft., Nelson notes, and climb is 700 fpm.



WITTMAN FLYING CARPET two-placer has been designed by racing pilot Steve Wittman. It is powered by an 85-hp. Continental and has 180-mph. top speed. Weight is 1,200 lb. fully loaded and fuel capacity is 28 gal. Flying Carpet has a sharply slanting nose to improve visibility.



STITS PLAYBOY (left) is posed with earlier design by Ray Stits, the tiny Sky Baby biplane. New single-place Playboy is offered in kit form, selling at $995. Powered by an 80-hp. Continental, it spans 20 ft. 6 in., grosses 510 lb. and has 135 mph. top speed. Under development is a two-place version with folding wings which will sell for $1,195 in a kit.

Jap Aero Team Looks for Comeback Data

• Mission's tour of U.S. aeronautical facilities is being conducted with aid of State Department.

By Irving Stone

A Japanese aeronautical mission consisting of a dozen experts from university circles, government agencies and industry is making an extensive inspection tour of U. S. aircraft research and manufacturing facilities.

Known as the Japanese Inspection Mission for Aeronautical Research (Jimar), the group will report back to the Japanese government on the completion of its cross-country swing in February.

▶ **Ready for Rebirth**—The data will be used as one of the bases for a framework of a reconstructed aeronautical activity now being pushed with considerable energy in Japan. The tour has been approved by the U. S. Department of State, which also has arranged for the sites to be visited under the travel schedule, it is reported.

Considering the great technological gap between Japan's aeronautical development today and that of the U.S. and countries in Europe, Japan has a long pull ahead before it can begin to approach the state of highspeed aviation art, as currently practiced. It is with the aid of the touring mission that Japanese aviation hopes to develop an effective approach for up-to-date aeronautical studies and production.

▶ **From This Base**—This is not to say that Japanese aviation has been dormant since the end of World War II. In the last two or three years, numerous steps have been taken to put the nation's aeronautics back on its feet, including the following:

• **Research.** While there is no jet research laboratory in Japan now, studies relating to jet engines have emphasized general theory, thermodynamics and gas dynamics. Gas turbine research has been conducted as a preparatory phase for turbojet research. Studies in compressibility, strength of materials, wing theory and airfoil cascade have been pushed.

• **Gas turbines.** Units in the 500-2,000-shp. range have been constructed by Japanese industry. Tests of these gas turbines already have been carried out.

• **Jet engines.** Trial manufacture of 2,000-lb.-thrust, axial-flow jets are underway at Omiya-Fuji Industries, Ltd. (formerly Nakajima Aircraft Co., Ltd.). Completion of the units is expected in the spring of 1954.

EXPLAINING AIMS of Japanese aeo mission. Prof. Tomojiro Moriya (seated left), head of team, is interviewed by Aviation Week's Irving Stone (right).

Initial manufacture of small jets also has been begun by Japan Jet Engine Co., Ltd., which was set up by joint investment of Fuji, New Mitsubishi and Ishikawajima (in heavy indutry), together with Fuji Precision Industrial Co., Ltd. Large jet engine designs are reported to be on the boards.

• **Aircraft.** First jet aircraft is targeted for completion next year. One report is that Shinmitsubishi will build the plane from its own design, although it will be similar to the Lockheed T-33. Engine will be built by Japan Jet Engine Co., Ltd. Another report— voiced by a member of the visiting group—is that the first jet plane will be an American-design trainer, with both airframe and engine built under license.

The Japan Machine Trading Co., Ltd. is said to be negotiating for the export of Bell Aircraft copter parts to the Philippine Air Forces under the Japanese company's reported license to sell the helicopter in the Southeast Asia territory.

A number of other manufacturers are reported to be "amalgamating" and securing agreements from foreign aircraft firms to set up for the exportation of aircraft to Southeast Asia.

Manufacture of small planes and spare parts is already said to be underway at several companies.

• **Avionics.** Very few avionic devices have been manufactured in Japan, it is reported, although various organizations in allied fields have begun investigation of ILS, GCA, VOR, ADF, DME and other systems.

Electronic apparatus for communication and industrial use is now being built by several firms.

• **Piston engines.** Repair work on reciprocating-type aircraft engines is being done by several Japanese companies. New Mitsubishi and Fuji are preparing to build piston powerplants under license from U.S. engine companies, for use by Japan's National Safety Agency.

▶ **World Tour**—Jimar already has inspected facilities in England, Sweden and France—the three top aero contenders abroad. This background, coupled with data gleaned on the final swing through this country, should give the Japanese a pretty good picture of what's new since their own aviation industry went into eclipse after World War II.

Head of the mission is Dr. Tomijiro Moriya, professor at the University of Tokyo. Only other university official in the group is an assistant professor at the Tokyo institution.

Three government officials are included in Jimar—the director of the Engine Division, Transportation Technical Research Institute, Ministry of Transportation; a chief official in the Ministry of International Trade and Transportation; and a lieutenant colonel

How Parker tank-mounted valves save weight by allowing 25% smaller fuel line sizes

"When you specify fueling equipment, you've got many problems to consider. We believe the best solution is offered by tank-mounted diaphragm valves like these", reports Everett Badger, shown at the right. He is Chief Engineer of the Fuel Division at Parker Aircraft Co.

"You can save weight", Badger adds, "because the lower pressure drop of tank-mounted valves allows you to use about 25 per cent smaller line sizes. Their pressure drop of about 6 psi at 200 gpm is roughly one-half the loss through a similar valve mounted in the fuel line (including exit losses where fuel enters the tank). These savings let you use smaller, lighter lines without reducing the rate of flow to the tank. In addition, tank-mounted valves weigh about 40 per cent less.

"In the nearly ten years since Parker first started making diaphragm valves, we've never had one rupture in service.

"As for contaminant resistance, there are simply no close fits in this valve or the pilot valve where contaminant might jam.

"The same basic diaphragm valve can easily include a second operating diaphragm unit to perform various functions such as flow proportioning or secondary fuel shutoff protection. Pilot line ports can be located on either the tube-inlet side or on top of the valve.

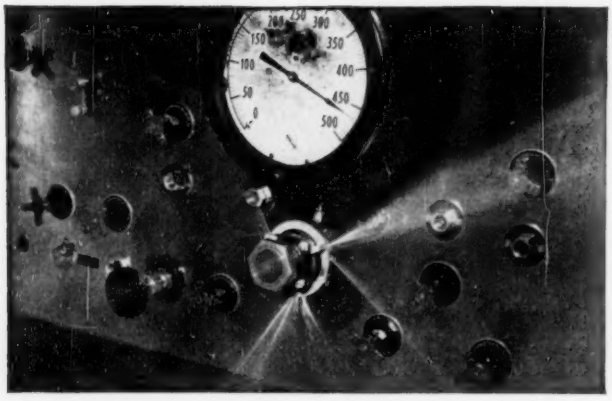
"Parker's pilot valves, like the one shown at the right, are available in single or dual styles with many auxiliaries. Because these valves are essentially pressure closed, there's no chance for 'hang-up' or faulty operation.

"A brand-new Parker booklet, 'Design Hints for Aircraft Fueling Systems', is just off the press. Send for your copy today."

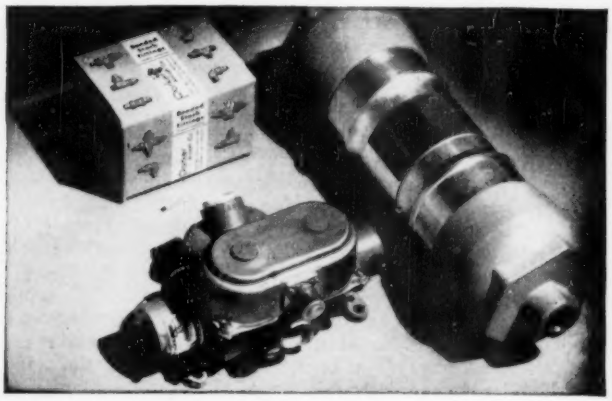
' ' '

PARKER AIRCRAFT CO.
5827 W. Century Boulevard, Los Angeles 45, California.
Subsidiary of The Parker Appliance Company

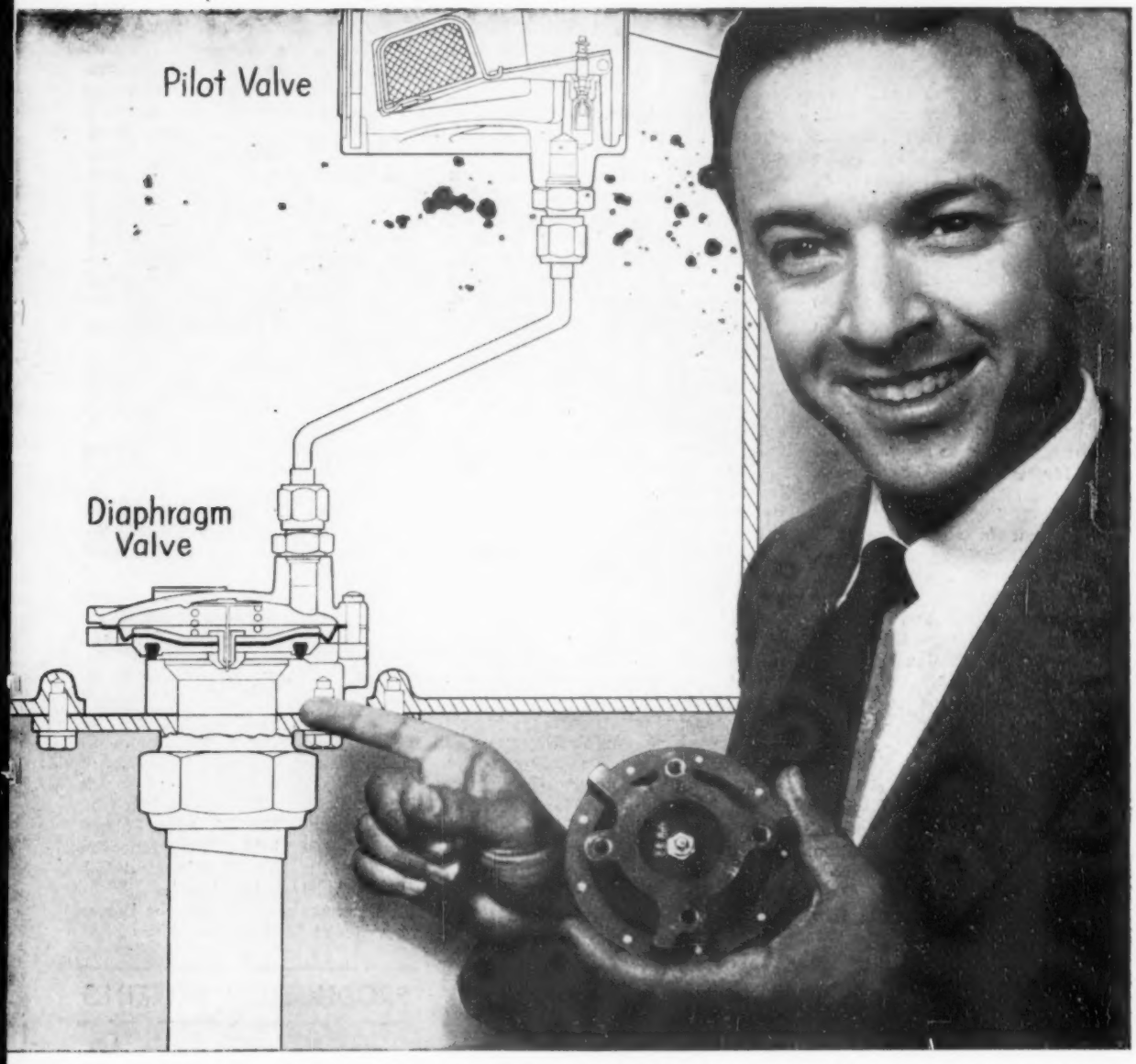
Parker
Hydraulic and fluid system components



Destruction test proves casting deflects far below 950 psi burst pressure of diaphragm. We've run millions of test cycles without failure of diaphragms.



What other components for hydraulic and fuel systems interest you? Parker Aircraft Co. builds a wide variety of engineered products for many different applications.



PARKER AIRCRAFT CO.
Section 801-C
5827 W. Century Boulevard, Los Angeles 45, California
Please send me information about the following:

- ☐ "Design Hints for Aircraft Fueling Systems"
- ☐ Information about these specific aircraft fuel or hydraulic products: _____

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____

C

Speed your inquiries for aircraft valves and fittings by addressing everything to Parker Aircraft Co. Both sales and engineering are now at this one location.

Mail this coupon today. Be sure to check the information desired. If you have any other questions, please write to Parker at the address shown above.

attached to the Technical Research Institute, National Safety Agency.

The remaining seven of the group are from industry. Represented are Omiya-Fuji Industry Co., Ltd.; Shinmitsubishi Heavy Industry Co., Ltd.; Ishikawajima Heavy Industry Co., Ltd.; Nippon Electrical Co., Ltd.; Tokyo Shibaura Electrical Co., Ltd.; and Sumitomo Metal Industry Co., Ltd.

Interests of this university-government-industry group are sufficiently diverse to cover a good segment of the overall aviation picture. These interests include highspeed aerodynamics (data on which is particularly lacking in Japan, it is reported); aerodynamics of jet engines; aeroelasticity of structures; aircraft and engine materials; jet engine and rocket aspects; avionic and electrical applications for aircraft and laboratories; and flight test and instrumentation.

▶ **Aims**—Targets set by the Japanese, which the visiting mission is helping to bulls-eye, are:

• **Establishment of an "Aeronautical Research Institute,"** to provide for study in the fundamental phases of aeronautics. This overall laboratory activity—a prime organization in Japan's aeronautical rebirth—would be patterned after our own National Advisory Committee for Aeronautics, Dr. Morija claims. Organization and administration aspects of modern aeronautical research systems are among the things the Japanese want to know.

• **Creation of new production equipment** to meet the demands of a modern aeronautical industry. A tour of such plants as Republic Aviation, Douglas Aircraft and North American Aviation has been included in the itinerary, probably to illustrate how these aviation giants operate on the production line.

• **A training program** to bring Japanese aeronautical engineers abreast of current developments and techniques. Unlike the situation in this country, Japan has a large reserve of diversified engineering talent to tap. Many of the large group of aeronautical engineers who were active in World War II aviation efforts are anxious to get back to technical tasks in the aeronautical field.

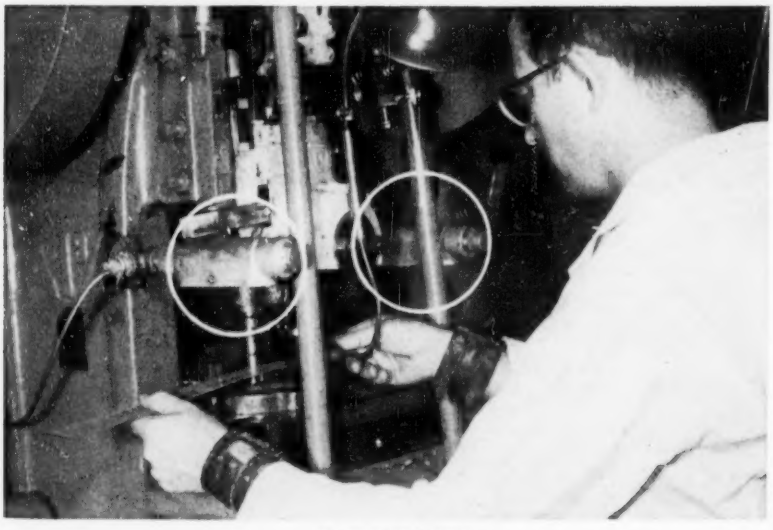
▶ **Schedule Here**—Plant and facility coverage in this country includes some of our top research establishments and manufacturing efforts. Military organizations also are included. The following organizations already have been visited or are scheduled for visits by one or more of three sections of the Japanese delegation, it is reported.

• **East Coast.** Republic Aviation Corp., Farmingdale, N. Y.; Naval Air Material Base, Philadelphia; Air Naval Development Board (U. S. Weather Bureau and Sperry Corp. project); Standard Oil Research Center, Linden, N. J.; Princeton University's Department of Aeronautical Engineering, Princeton, N. J.; Curtiss-Wright Corp.'s Electronics Division, Wood-Ridge, N. J.; Institute of the Aeronautical Science's Annual Meeting, New York; Massachusetts Institute of Technology's Department of Mechanical Engineering, Cambridge, Mass.; Continuous Metal Casting Corp., New York; Fairchild Engine & Airplane Co., Hagerstown, Md.; Allegheny-Ludlum Steel Corp., Watervliet, N. Y.; American Electro Metals Corp., Yonkers, N. Y.; U. S. Steel Research Laboratory, Kearney, N. J.; Minneapolis-Honeywell's Brown Instrument Division, Philadelphia; Air Research and Development Command, Baltimore; Bendix Aviation Corp., Towson, Md.; General Electric Research Laboratory, Schenectady, N. Y.; Radio Corp. of America Laboratories, New York; Federal Telecommunication Laboratories, Nutley, N. J.; National Advisory Committee for Aeronautics' Langley Laboratory, Langley, Va.; National Bureau of Standards, Washington, D. C.

• **Mid-West.** Air Materiel Command, Wright-Patterson AFB, Ohio; Standard Oil Co. of Indiana, Whitney, Ind.; Civil Aeronautics Administration's Technical Development and Evaluation Center, Indianapolis; NACA's Lewis Laboratory, Cleveland; Bendix Products Division, Detroit; General Motors Corp.'s Technical Center, Detroit; Society of Automotive Engineers' Annual Meeting, Detroit; CAA's Aeronautical Center, Oklahoma; U. S. Steel Corp., Pittsburgh; Thompson Products, Cleveland; Dow Chemical International Ltd., Midland, Mich.; Ford Motor Co., Detroit, and Bendix Aviation Corp., South Bend, Ind.

• **West Coast.** California Institute of Technology's Guggenheim Aeronautical Laboratory, Pasadena; University of California's Low Pressure Research Project, Berkeley; Douglas Aircraft Co., Santa Monica; NACA's Ames Laboratory, Moffett Field; North American Aviation, Inc., Los Angeles; and Gilfillan Bros., Inc., Los Angeles.

The group also will visit the Bureau of Mines at Boulder City, Nev.



SAFE HANDS

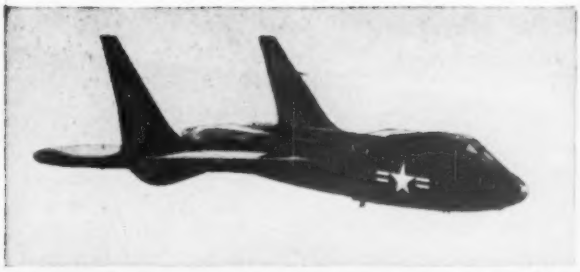
Geiger tubes (circled) protect mechanic's hands from injury while using this punch press, by reacting to radioactive crystals in employe's wristbands and stopping machine in mid-stroke should his hands stray into danger area. Machine will not start if mechanic does not wear his safety wristbands. Industrial device is seen being used by United Air Lines at San Francisco maintenance base.

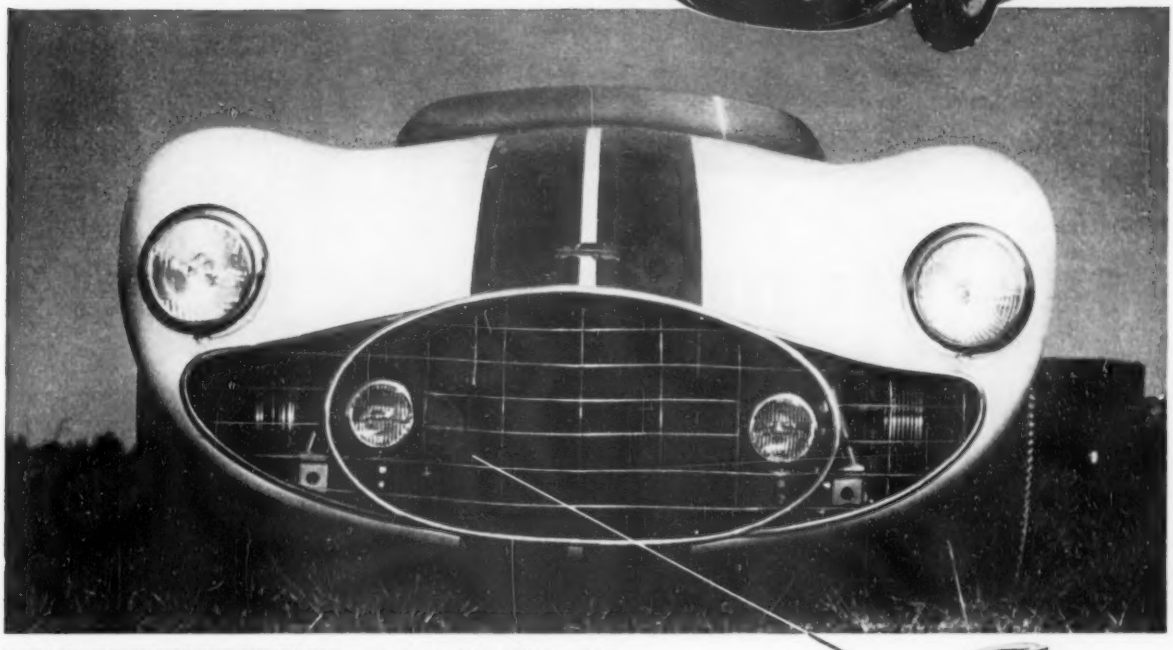
PRODUCTION BRIEFING

▶ **Hughes Aircraft Co.,** Tucson, Ariz., has received USAF approval for construction of assembly, storage and explosives-handling facilities on a 1,300-acre tract. Air Materiel Command has been authorized to spend up to $2.4-million on the facility. Production accent will be on guided missiles.

▶ **Gill & Willis** is a new airport planning, engineering and management consultant service organized by Grayson Gill and C. L. Willis, with offices at 1913 San Jacinto St., Dallas, Tex.

▶ **Lusk, Inc.,** Anaheim, Calif., is a new firm specializing in aircraft, mechanical and tool engineering, tool and die fabrication and design and development of special machines. President is Arthur I. Lusk, formerly assistant to the president of Northrop Aircraft, Inc.





THIS LATEST CUNNINGHAM SPORTS CAR won its class and placed 3rd on distance in the grueling International 24-hour road race at Le Mans, France, in June, 1953. It absolutely cannot operate without an effective, lightweight oil cooling system — the engine bearings would burn out in less than one hour! That's why a Clifford 6" circular oil cooler, seen beside the right front brake drum, is essential. Cunningham engineers report it kept the oil cool during the entire 24 hours of racing — 2498.23 miles of road-pounding torture above 100 MPH average speed.

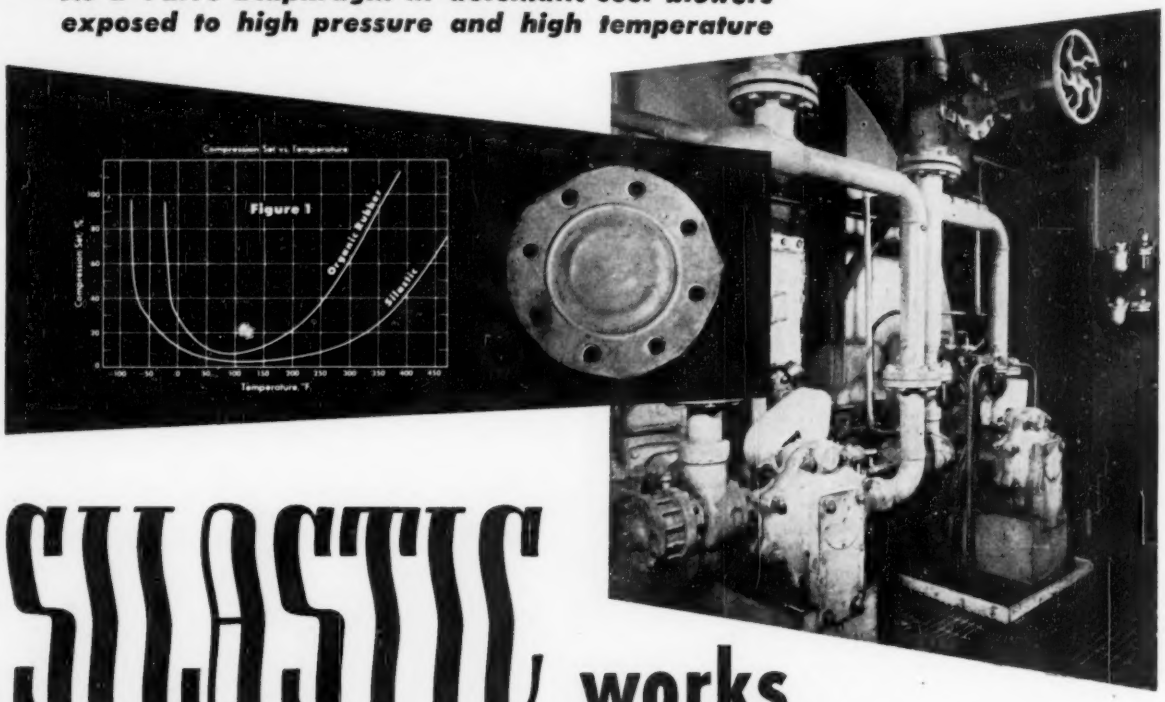
At any altitude... Clifford oil coolers are vital

In the air as on the ground, Clifford Feather Weight All-Aluminum Oil Coolers bring exceptional benefits to the protection of engine lubricating systems. For one thing, they're *the only all-brazed type of oil cooler.* Another big advantage is their superior weight-strength ratio — the result of Clifford's patented aluminum brazing method and pre-testing in the largest, most modern wind tunnel laboratory in the aeronautical heat exchanger industry. You'll find Clifford Feather Weights in every type of modern aircraft, military or civilian, jet or piston powered. For further details, write Clifford Manufacturing Company, 136 Grove St., Waltham 54, Mass. *Division of Standard-Thomson Corporation.* Sales offices in New York 17, Detroit, Chicago 1, Los Angeles.

HYDRON METAL BELLOWS CLIFFORD MANUFACTURING CO. WALTHAM, MASS. HEAT EXCHANGERS

CLIFFORD HEAT EXCHANGERS
... CUSTOM ENGINEERED
FOR MORE EFFICIENT HEAT TRANSFER

As a Valve Diaphragm in automatic soot blowers exposed to high pressure and high temperature



SILASTIC works

where other materials fail!

Valve diaphragms of cotton coated with a heat-stable organic rubber lasted only 10 to 30 days at temperatures from 110 to 150 F with pressures ranging from 40 to 500 psi, in automatic boiler-tube soot blowers. With each boiler served by 38 blowers and each blower equipped with 1 to 4 diaphragms ranging from 3 to 6 inches in diameter, maintenonce was a full-time job for one man.

Two years ago diaphragms coated with Silastic*, the Dow Corning Silicone rubber, were installed to determine their relative life expectancy. Under these same conditions those diaphragms lasted 3 to 9 months or about 9 times the life of the diaphragms coated with synthetic organic rubber.

Such performance has established Silastic as an ideal diaphragm and gasketing material in hundreds of applications where rubbery properties must be retained at both high and low temperatures, or after long exposure to weathering and oxidation, or in contact with a variety of hot oils and chemicals. The superiority of Silastic as a gasketing material is clearly established in Figure 1. In this figure, compression set values for a high quality organic rubber and a Silastic stock recently developed for extreme temperature use are plotted at temperatures from —100 to 500 F. These new Silastic stocks have 2 to 6 times the mechanical strength, better tear resistance, and at least 4 times the abrasion resistance of earlier silicone rubber stocks.

Other new Silastic stocks are unequaled as electrical insulating materials because they retain good dielectric properties over a wide temperature span; combine high thermal conductivity with excellent resistance to moisture, corona, and to both mechanical and electrical fatigue.

It pays to consider Silastic first whenever you need rubbery properties in a dielectric material, or wherever diaphragms, gaskets, seals or industrial parts must give reliable service at temperatures far above or below the limits of any other kind of rubber.

*T.M. REG. U.S. PAT. OFF.

Dow Corning Corporation, Dept. D-13, Midland, Michigan

Please send me: ☐ Silastic Facts 10a, properties and applications of Silastic stocks and pastes.
☐ List of Silastic Fabricators
☐ "Tall Tales and Fabulous Facts", a 24-page booklet on the properties of Dow Corning silicones.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

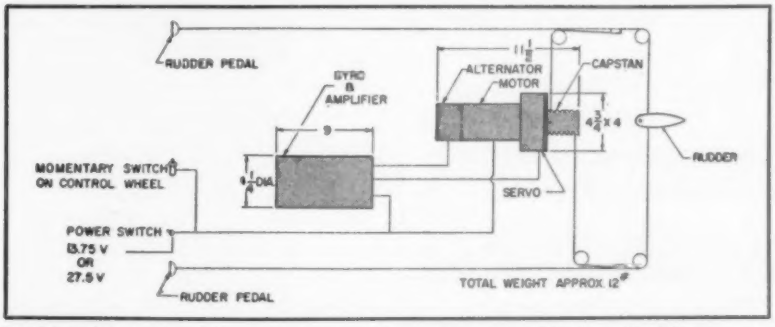
Mail Coupon Today for data on the Properties, Performance and Applications of Silastic.

FIRST IN SILICONES

DOW CORNING CORPORATION

MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEW YORK • WASHINGTON, D.C. (Silver Spring, Md.)
In Canada: Dow Corning Silicones Ltd. • In England: Midland Silicones Ltd.



ELECTRICAL and cable connections are shown for Acron lightplane installation.

Arcon Prevents Lightplane Spirals

Lowcost, lightweight Lear unit for planes up to size of Twin Beech was developed from F-86D yaw damper.

Los Angeles—Lear, Inc., has developed a new "automatic rudder" for lightplanes up to Twin-Beech size that is designed to prevent an inadvertent spiral under instrument conditions and to smooth out rough air flying. The 12-lb. device is expected to sell for $595 and be in production by April, according to William P. Lear, board chairman.

The new automatic rudder control, called Acron, is a lowcost, lightweight adaptation of the Lear yaw damper used in USAF's F-86D to take out unwanted oscillations at high speed (AVIATION WEEK Feb. 16, p. 59).

▶ **What It Does**—If a lightplane can be kept flying in a straight line whenever a gust drops a wing, the plane's inherent lateral stability will return the wing to level, preventing a spiral. Arcon automatically operates the plane's rudder to oppose any change in aircraft heading, much like the device developed by Javelin Aircraft Co. (AVIATION WEEK Mar. 23, p. 34). By this action, the automatic rudder prevents a spiral and makes gusty air flying easier.

Lear, whose company makes lightplane autopilots, emphasizes that Acron is not designed to hold aircraft heading.

"It (offers) at moderate cost and low weight, a substantial number of the advantages now enjoyed by pilots flying with completely automatic flight control systems," Lear says.

A directional gyro, available for around $500, can be added to Arcon to form a single-axis autopilot and give it heading-holding capabilities.

▶ **Simple System**—Arcon consists of two units:

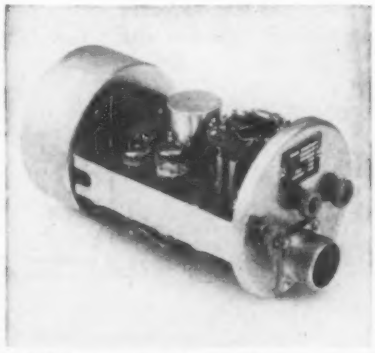
• **Rate gyro-amplifier,** which senses airplane yawing and generates a counteracting signal.

• **Rudder servo,** which displaces rudder in accordance with these signals. The servo employs a d.c. motor and two magnetic powder clutches, resembles servos used in Lear F-5, L-2, and L-5 autopilots.

Gyro-amplifier dimensions are approximately 4¼ in. dia., 9 in. long. Servo dimensions are 4¾ x 4 x 11½ in.

One of the problems in adapting the F-86D damper design was the lack of 400-cps. a.c. power in lightplanes. Lear solved this by building a small a.c. generator into its servo, driven from the continuously running motor. The Arcon rate gyro is essentially the same simple design, employing no gimbal bearings, used in the F-86D damper; many of the component parts are interchangeable. The five tubes required for the F-86D system have been cut to two in the latest Arcon design.

Lear has conducted Arcon flight tests in a Beech Bonanza and a Piper Tri-Pacer.—PK



ACRON amplifier/gyro with cover removed. Cylindrical covered element at left is the rate gyro.

IRE Symposium on Automatic Factory

A symposium on automatic factory production of electronic equipment has been scheduled by the New York section of the Institute of Radio Engineers for Saturday, Jan. 23, immediately following the national convention of the Institute of Electrical Engineers.

The Navy's recently announced Project Tinkertoy (AVIATION WEEK Sept. 28, p. 17), the USAF's automation project at Stanford Research Institute, and the Signal Corps automatic factory program at General Electric will be discussed.

Speakers include R. L. Henry, National Bureau of Standards (which developed Tinkertoy); Freeman Hom, Stanford Research Institute; Walter Hausz, General Electric electronics laboratory; R. F. Mallina, Bell Telephone Labs; and W. H. Hannahs, Sylvania Electric Products, Inc.

The automation symposium will be held at the Engineering Societies Bldg., 33 W. 39th St., New York, starting at 10 a.m.

Advance registration may be made by writing to Prof. M. Wind, Microwave Research Institute, Polytechnic Institute of Brooklyn, 55 Johnson St., Brooklyn 1, N. Y. Registration fee for IRE members is $2.00; for nonmembers the fee is $4.00.

Tinkertoy Tinkerers Get Assembly Kit

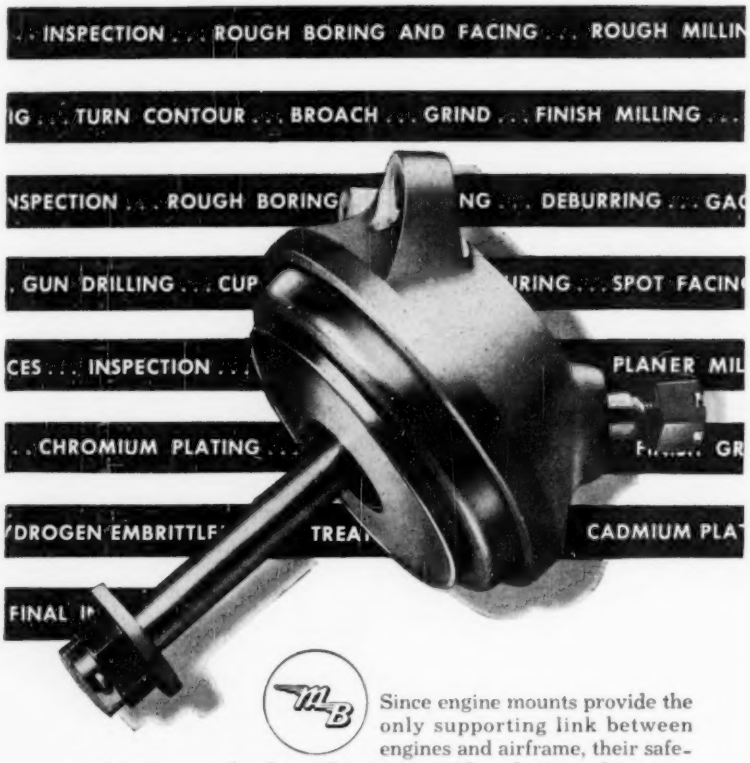
Engineers who would like to experiment with the recently announced Project Tinkertoy type of electronic modular assemblies, can now build up Tinkertoy units in the laboratory, using a new design kit announced by Communication Measurements Laboratory, Inc.

The Tinkertoy-type of modular construction, developed by the National Bureau of Standards for the Navy Bureau of Aeronautics, was described in AVIATION WEEK Sept. 28, p. 17 and Oct. 12, p. 72.

The kit, PT-1000, was developed by CML (which worked with NBS on Project Tinkertoy) to enable engineers to familiarize themselves with the Tinkertoy technique by fabricating experimental units on a laboratory basis. The kit consists of module components, such as tape resistors, printed capacitors, standard wafers, and tube sockets, as well as a variety of specially designed hand tools and accessories such as a module assembly jig, silver firing fur-

because its job is vital...

this mount is made without "cutting corners"



Since engine mounts provide the only supporting link between engines and airframe, their safety factor must be beyond question. Also their performance.

This takes expert engineering, plus strong alloys, tough forgings, uniformity of materials, precise machining, rigid quality control, infallible inspection – all of which you'll find back of MB Mounts. No corners cut on quality. These products get the full treatment, right from raw materials specifications all the way to inspection by the latest in flaw finding methods.

Widespread, consistent usage of these MB engine mounts by the aviation industry for the last 15 years proves that they're not only engineered right but also produced right.

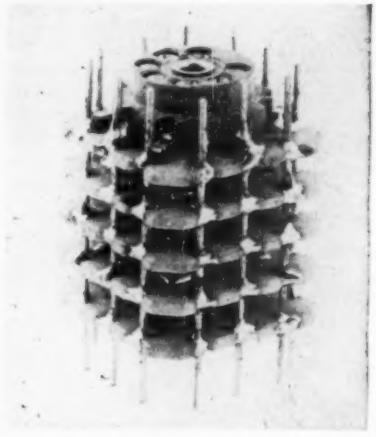
Remember – Vibration is MB's specialty. You're invited to draw on the results of this specialization – namely, highly qualified products and technical help.

the MB manufacturing company, inc.

1060 State Street, New Haven 11, Conn.

HEADQUARTERS FOR PRODUCTS TO ISOLATE VIBRATION

... TO EXCITE IT ... TO MEASURE IT



nace, drying oven, notch tinner, and midget soldering iron.

Tinkertoy design kit can be obtained from Communication Measurements Laboratory, Inc., 350 Leland Ave., Plainfield, N. J. Price is $2,175.

FILTER CENTER

► **New Type Transistor**–USAF's Cambridge Research Center has been able to increase operating frequency of point-contact transistors without loss of amplification by substituting gold "cat whiskers" for the commonly used phosphor bronze whiskers. AFCRC is sponsoring further development of the gold bonding process at Transistor Products, Inc., Rahway, N. J.

► **Narco Sets up DME School**–National Aeronautical Corp. (Narco) plans to train field representatives to maintain and service its DME (distance measuring equipment) at a school in its Ambler, Pa., plant.

► **Bendix to Build 3-Cm. Radar**–Despite fact that Arinc radar spec. calls for a 6-cm. set, Bendix Radio believes there is sufficient airline interest in a 3-cm. radar to cast its lot with the shorter wavelength. Company hopes to flight test a prototype radar this spring, have production units by next fall. Set is expected to sell for less than $15,000, a spokesman says.

► **New RTCA Report Plan**–Non-member firms who would like to get copies of all reports by the Radio Technical Commission for Aeronautics can now do so easily. (RTCA reports, on communication, traffic control, navigation, and other avionic subjects, are issued at irregular intervals, normally cost about 40 cents.) By making a $5 advance deposit, non-members will receive a copy of every RTCA report issued, without having specifically to

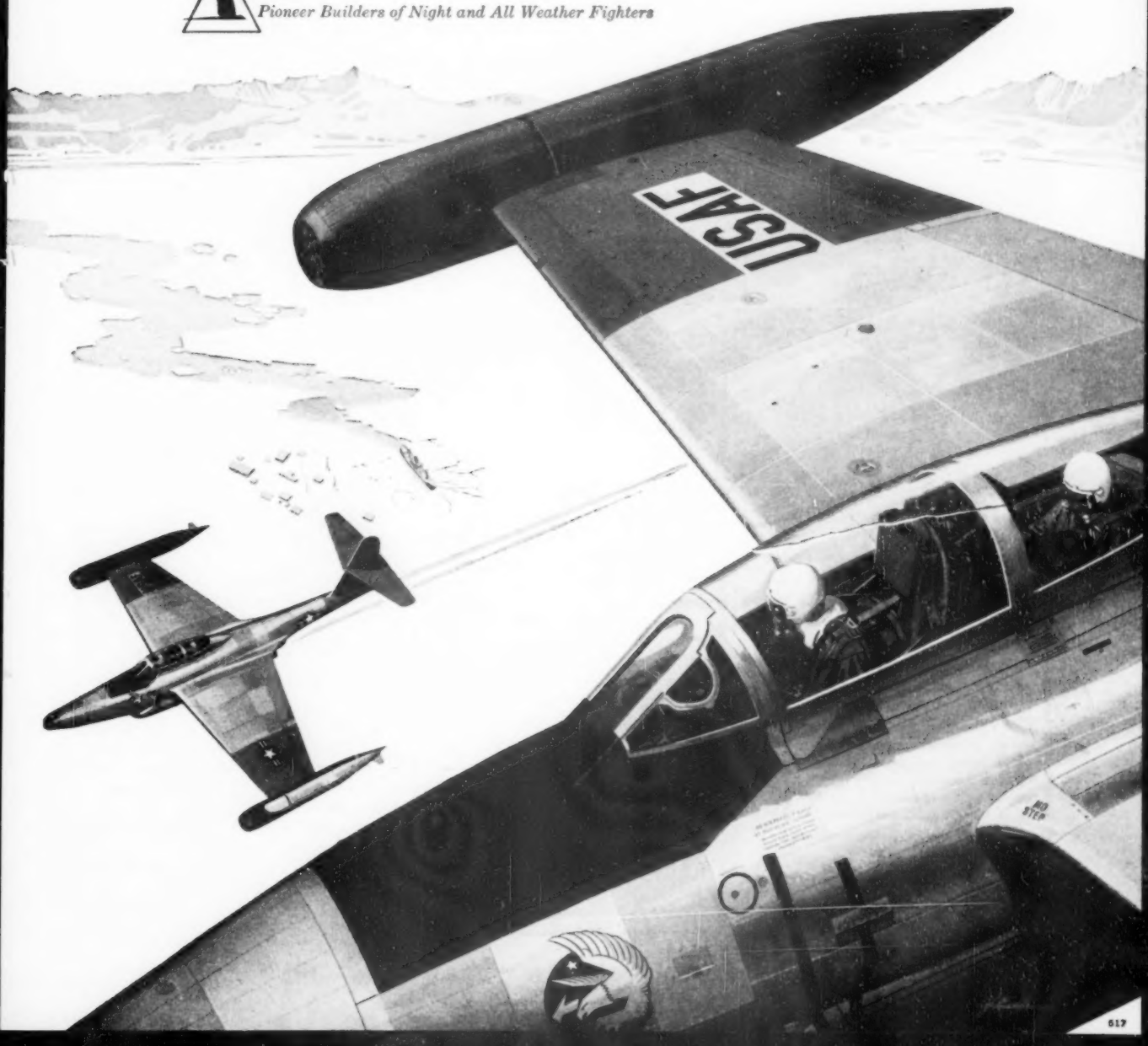
Arctic Sentinels

Thousands of miles away, long-range Northrop F-89 Scorpions stand guard night and day along the top-of-the-world route to America's heart, defending our homes and industry • These lethal USAF defenders will "scramble" at the first flash-warning from the polar radar chain. With deadly armament, latest radar, and ability to range over a defense zone up to 2000 miles in depth, they can strike, follow, harass, and destroy an invader hours before he can reach target • The Scorpion F-89 is America's most heavily armed fighter. It is a product of the precision team of Northrop men and machines.

NORTHROP

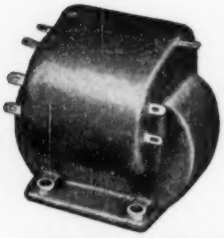
NORTHROP AIRCRAFT, INC. • HAWTHORNE, CALIFORNIA

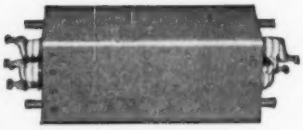
Pioneer Builders of Night and All Weather Fighters



FOR MILITARY OR AVIATION APPLICATIONS

Acme ACME Electric





All the experience of 35 years of transformer building is now available to west coast buyers of electronic and MIL-T-27 transformers thru our west coast engineering laboratories. Adequate facilities for designing quality transformers are available on your requirements.

ACME ELECTRIC CORPORATION
MAIN PLANT: 851 Water Street • Cuba, N. Y.
West Coast Engineering Laboratories: 1375 W. Jefferson Blvd. • Los Angeles, Calif.
In Canada: ACME ELECTRIC CORP. LTD. • 50 North Line Rd. • Toronto, Ont.

Acme ACME Electric
TRANSFORMERS

AIRCRAFT VALVES BY CIRCLE SEAL

Established Quality
Unexcelled Performance

CHECK VALVES—200 Series for low pressure or high pressure pneumatics. 800 Series for low pressure pneumatics or fuel.

SHUTTLE VALVES—400 Series for low pressure or high pressure pneumatics.

ALSO: *Breather valves, thermal relief valves, manual bleed valves.*

Where leakage is critical—
Specify Circle Seal and be sure!

CIRCLE SEAL *precision valves*
JAMES•POND•CLARK
2181 East Foothill Blvd., Pasadena 8, Calif.

Save ⅔ of your Wire Twisting Costs with ROBINSON WIRE TWISTERS

Manufacturers, sub-assembly plants, airlines, military bases, research, and overhaul organizations all over the world are now safety wiring 3 engines, with the split-second whirling action of the Robinson Wire Twister, in the time required for one by any other method. Savings up to $140 per engine are enough to pay for 8 twisters. 3-tools-in-1: pliers, cutters, twister. 12" and 9" length. $19.50 ea.—$18.50 ea. in doz. FOB Sacramento. *Unconditionally guaranteed.* Write for details.

RALPH C. ROBINSON CO.
Box 494-421
North Sacramento 15, Calif.

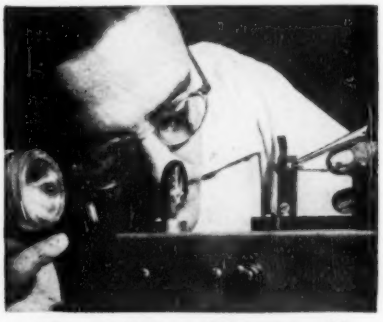
order it, until accumulated report costs have exhausted the initial deposit. RTCA address is: 1724 "F" St., N.W., Washington 25, D. C.

► **Holland Buys Collins VOR**—Netherlands government has purchased a dual 200-watt VOR station from Collins Radio for its Department of Civil Aviation for installation by next Fall at the Amsterdam airport. This is Collins' first foreign VOR sale.

► **VOR-Equipped Pipers Increase**—Survey of Piper airplane owners shows that 59% of Pacers and Tri-Pacers are equipped with omnirange receivers, compared to 17% two years ago, according to bulletin put out by National Aeronautical Corp. (Narco), which makes lightplane radio equipment. Narco notes that 84% of four-place Pipers are equipped with VHF transmitters today, compared to only 4% two years ago. Narco equipment is standard in the Piper custom and super-custom models.

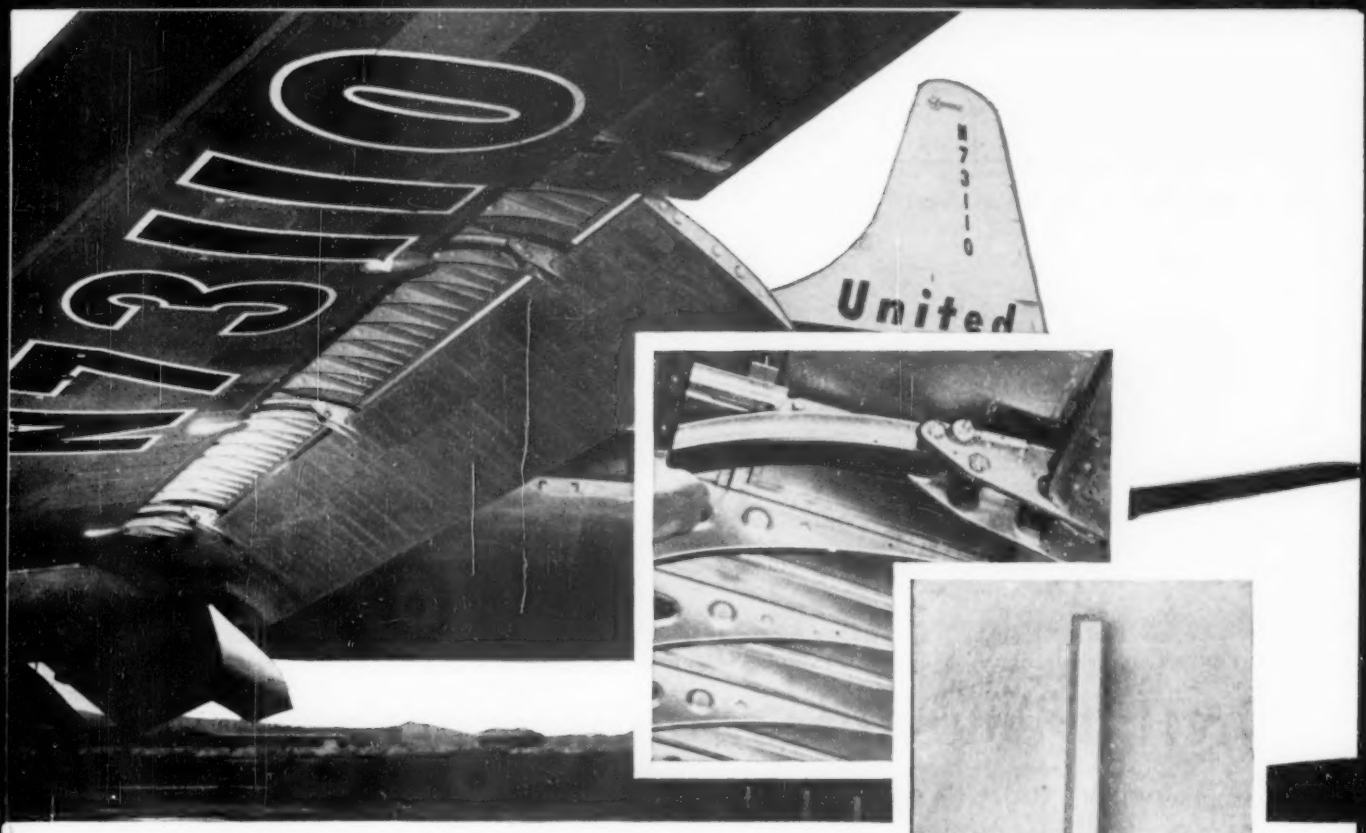
► **Automation Symposium**—Symposium on Automatic Production of Electronic Equipment, sponsored jointly by Stanford Research Institute and USAF, will be held at San Francisco's Fairmont Hotel Apr. 19-20.

► **KLM Increases HF Channels**—KLM Royal Dutch Airlines engineers have modified their 10-channel HF transmitters (Collins wartime ART-13s) to provide 107 individual crystal-controlled channels to meet present and future operational needs. Program also includes addition of automatic antenna tuners. —PK



Transistor Photocell

Tiny transistor photocell, a p-n junction type germanium device developed by General Electric, is extremely sensitive, particularly to infrared radiation, which makes it attractive for use in missiles designed to seek out heat-radiating targets. GE says new device (still in the experimental stage) generates a signal large enough to operate relays directly, without intermediate amplification. New photocell is also sensitive to nuclear radiation, making it a potential substitute for Geiger counters, GE says.



Cost of wing flap supports cut 75% with rolled structural T-sections of U·S·S Carilloy steel

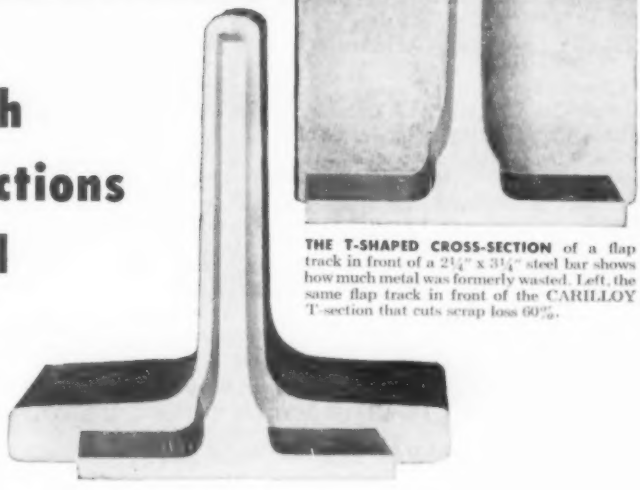
• Wing flap supports for Consolidated Vultee's Model 340 Convair airliners are stronger, cost *less*, and are of better quality now that they are made from hot-rolled structural T-sections of U·S·S CARILLOY steel.

When J. C. Peacock Co., of Los Angeles, California, started making these T-shaped flap tracks for Convair, the accepted practice was to machine them from 2¼" x 3¼" bars of alloy steel. But machining took a lot of time, and more than 50% of the stock metal was wasted in scrap.

Peacock and Convair engineers studied the problem and soon realized that they could shorten machining time and reduce scrap losses by fabricating directly from rolled sections. They found just what they were looking for in hot-rolled T-sections of CARILLOY 4140.

This steel is giving excellent results. Not only are the CARILLOY parts *stronger* than those formerly used, but they require 4 hours less machining time, and reduce scrap losses 60%. Finished tracks now cost only *one-fourth* as much as they did before.

Our experienced steel engineers and metallurgists may be able to help you make similar savings. Just call our nearest District Office.



THE T-SHAPED CROSS-SECTION of a flap track in front of a 2¼" x 3¼" steel bar shows how much metal was formerly wasted. Left, the same flap track in front of the CARILLOY T-section that cuts scrap loss 60%.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

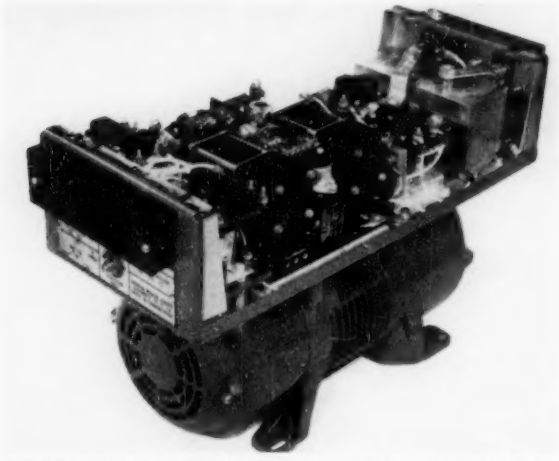
Carilloy Steels

USS

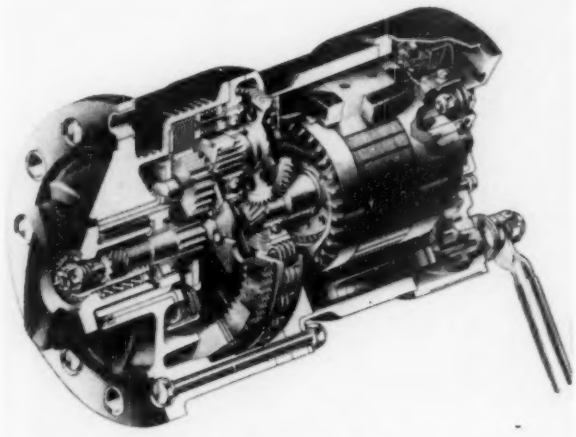
ELECTRIC FURNACE OR OPEN HEARTH
COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

4-291

UNITED STATES STEEL



INVERTER with voltage and frequency regulator mounted on top.



JH6C ENGINE STARTER is commercial version of military JH6.

J&H 'Demobilizes' Military Accessories

Company turns to commercial airlines for advice as it takes new look at aircraft equipment line.

By George L. Christian

Cleveland—A program to adapt military aircraft accessories to commercial airline needs is actively under way at Jack & Heintz headquarters here.

As J&H puts it, the program aims to "effect as efficiently and quickly as possible modifications to certain military accessory designs which will make them better suited to the somewhat different service life and maintenance requirements of commercial operation."

▶**Airline Requirements**—To find out what special requirements the commercial carriers wanted in their accessories, J&H engineers went straight to several airlines.

They went to United Air Lines for generator advice. United, Eastern and Delta were consulted jointly on starters.

Several years ago, Jack & Heintz sent UAL four generators which were operated in scheduled service to their normal overhaul period. Then they were pulled, disassembled and carefully examined. United suggested 23 changes. After an engineering meeting, the 23 changes were incorporated in a generator now designated the G23-1. Among companies contemplating use of this generator is Douglas Aircraft Co., to whom J&H shipped four units for installation on a DC-7 mounting R3350 Turbo Compound engines. J. E. Mulheim, the firm's chief engineer, says.

Mulheim states the G23-1 can generate sufficient power at engine idling speeds for average preflight checks—it delivers 250 amp. at 1,000 engine rpm. (which gives 3,000 generator rpm. because of the 3x1 drive).

Overhang moment is a low 335 in. lb., reducing stresses imposed on the engine's gear case and minimizing vibration-induced stresses and possible resultant cracking of the engine's rear case.

Generator's normal output is 400 amp. in the 3,800-8,000-rpm. speed range.

▶**Starters**—United, Eastern and Delta maintenance personnel handed J&H many constructive suggestions on what they wanted in a starter. So Jack & Heintz went to work on its basic military JH6 starter, and redesigned it to meet more adequately commercial airline standards.

In the redesign, J&H has permitted interchangeability of parts between the military JH6 and the JH6C civilian version. This allows the thousands of existing military starters to be readily convertible by the airlines, instead of having to be replaced entirely by new units. Cost saving is considerable, company officials point out.

To convert the JH6 to the JH6C, Jack & Heintz keyed sleeve bearings to eliminate loosening and resultant housing wear; designed armature bearings to prevent rotation of bearing race on shaft journals and in bearing liners; used silver-soldered commutator connections to improve high-temperature operation; cut planetary gears from forgings to increase tooth strength and impact-absorbing characteristics; chrome plated high-pressure driving surfaces to prevent fretting corrosion and wear.

J&H also employed special gear and bearing lubrication for more effective and longer life under airline environmental conditions; used brushes with improved materials, greatly extending replacement life.

The JH6C starter is available in three models:

- **F**, for engines with a cubic-inch displacement of 1,000-2,650 and a 5-in. bolt circle.
- **E**, for 2,650-3,500-cu. in. displacement and 5¼-in. bolt circle.
- **P**, for engines with 2,650-4,500-cu. in. displacement and special gear ratio for higher jaw speed on engines having a starter jaw-to-engine crankshaft gear ratio of 3:1. This ratio on engines that are using the E and F models is 1:1.

The various models of the JH6C starter may be purchased with end or side terminals, conventional or keyhole mounting flanges, and either right- or left-hand jaw rotation.

▶**Expanding Program**—J&H soon will be testing still other accessories designed specifically for commercial airline use, according to officials of the company.

The new DA47-3 motor, now in production for advanced commercial aircraft, will drive Freon compressors of cabin air conditioning units. The

VICKERS®

A Single *Responsible* Source for Aircraft Hydraulic Products

PUMPS

a. Fixed Displacement
b. Variable Displacement
   (1) Automatic Pressure Compensated
   (2) Cylinder Controlled
   (3) Electrically Depressurized
   (4) Flow Reversing
   (5) Servo Controlled

ACCUMULATORS

a. Spherical
b. Cylindrical

MOTORPUMPS, AUXILIARY

a. Electric Motor Driven Fixed Pumps
b. Electric Motor Driven Variable Pumps

PRESSURE CONTROLS

a. Relief Valves
b. Pressure Regulators
c. Sequence Valves
d. Pump Control Valves
e. Pressure Reducing Valves
f. Reducing Relief Valves
g. Brake Valves
h. Other Special Valves

MOTORS

a. Fixed Displacement
b. Constant Speed (Automatic)
c. Variable Displacement

DIRECTIONAL CONTROLS

a. Four Way Valves
b. Selector Valves
c. Servo Valves
d. Other Special Valves

OTHER

a. Hydraulic Drive Systems (for Armament, Electronics, Pneumatics and other)
   (1) Variable Proportional
   (2) Directly Proportional
   (3) Constant Speed
   (4) Specially Controlled
b. Winch Systems
   (1) Heavier Than Air
   (2) Lighter Than Air
   (3) Helicopters
c. Electro-Hydraulic Servo Systems
d. Special Hydraulic Devices

Various special devices not listed above are also manufactured. Phone, wire or write us for a proposal describing the aircraft hydraulic accessory required for your particular project. Details of the above products are available on request. Ask for the new General Bulletin A-5200-B which will introduce you to our complete Aircraft Products line.

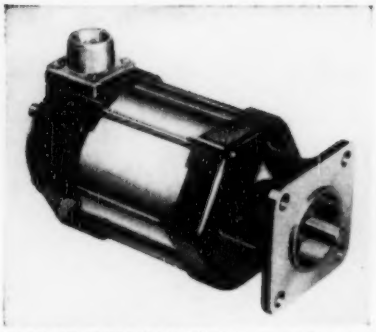
VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION
1462 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering and Service Offices:
El Segundo, California, 2160 E. Imperial Highway
Houston 5, Texas, 5717 Kirby Drive
Detroit 32, Michigan, 1400 Oakman Blvd.
Additional Service Facilities at:
Miami Springs, Florida, 641 De Soto Drive

TELEPHONE: TOwnsend 8-5100 • TELEGRAMS: Vickers WUX Detroit • TELETYPE "TWX" DE89 • CABLE: Videt Detroit

6672

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



PROP-SYNCHRONIZING generator designed by J&H for commercial aircraft.

D.C. GENERATOR develops 300 amp. with engine idling at 3,000 rpm.

self-cooled motor has a 9.5 hp. continuous duty rating at 27 v. d.c.

The firm is also selling tachometer generators on a controlled program—service behavior of the units is being carefully checked. A quantity was sent out to the airlines with requests that J&H be advised of any improvements the airlines can suggest. The manufacturer is now in the process of evaluating the responses.

▶ **Other Products**—Jack & Heintz makes a large variety of other airborne equipment for military and commercial use. Among the newer products are:

• **Alternators.** J&H's extensive line of airborne a.c. generators range in size up to a 120-kva. unit which is 11 in. in diameter and weighs about 240 lb. Destined for the military, the alternator is not intended for engine mounting, so overhang moment is no problem. Unit will be installed remotely from the engine. It can be driven either by a shaft from the engine or by auxiliary gas turbine units. The alternator is twice the size of the 60-kva. units currently in use. J&H is also developing a 125-kva. alternator for the Corps of Engineers, which will be installed in a portable, gas-turbine-powered package.

Airborne generators are usually somewhat cheaper that their industrial counterparts when produced in comparable quantities, according to company spokesmen. Reason is that the lighter airborne units use so much less material, that the savings more than compensate for any special manufacturing procedures which may be required. The usual rule is that airborne equipment costs many times the price of its industrial equivalent.

• **Actuators.** The firm makes a long line of rotary actuators for operating landing gear and wing flaps on such Boeing planes as the B-52, B-47, C-97 and 377 Stratocruiser. J&H makes the motors and actuators for operating and pumping the fuel in the "flying boom" of the KC-97 tanker's flight refueling system.

The company also manufactures a combination hydraulic-electric actuator for operating the horizontal tail stabilizer on a new jet fighter. Primarily a hydraulic actuator, the unit automatically changes over to electrical operation in case of hydraulic system failure.

J&H officials say that in the larger actuator line, all are tailor-made for a specific installation—none come "off the shelf."

• **Magnetic amplifier regulators.** Jack & Heintz has successfully developed several types of regulators using magnetic amplifiers. For inverter controls, this includes both frequency and voltage regulators. For a.c. generators, a new, completely static, all-magnetic voltage regulator has been developed.

• **Protective systems.** J&H also designs and manufactures both a.c. and d.c. protective panels. These units include the Air Force standard panels, as well as special systems, both panelized and component-type.

• **Cooled alternators.** Environment-free alternators are another J&H development. The units are evaporant (water)-cooled, the resultant steam being dumped overboard.

• **Tank generator.** When J&H was assigned the job of building a tank generator recently, the company found itself space-limited for the amperage output required. But J&H engineers applied aircraft design technique, which resulted in a very satisfactory unit. They also supply tank engine starters which are of modified aircraft design.

▶ **Operating Organization**—The operating organization at Jack & Heintz is such that the company can manufacture small or large quantities, with a minimum of lost motion, company officials say.

The organization is so arranged that it can handle prototype quantities from one to five units, and evaluation quantities of approximately 10-20 units. From here it is in position to go into quantity production with no limit on the number of components manufactured.

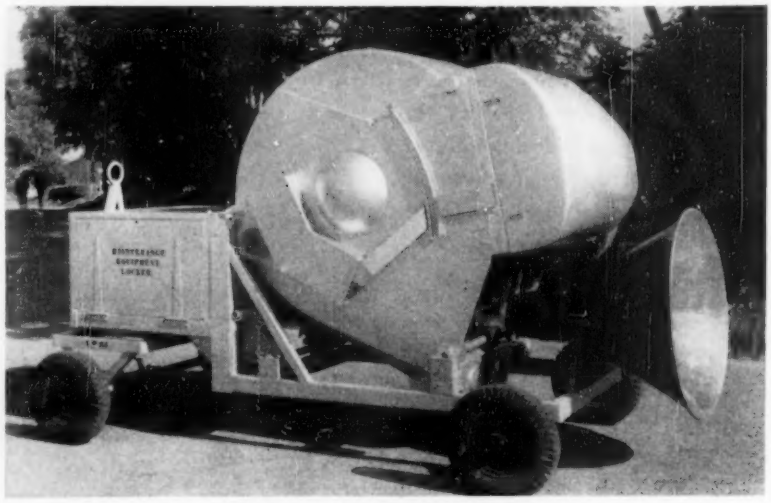
Jack & Heintz sales outlook is good. Some comparative figures for 1951 and 1952, respectively, indicate the company's growth:

• **Sales billed,** $22,701,000 and $29,629,000.

• **Year-end unfilled orders,** $41,603,000 and $55,731,000.

• **Employment,** 2,910 and 3,412.

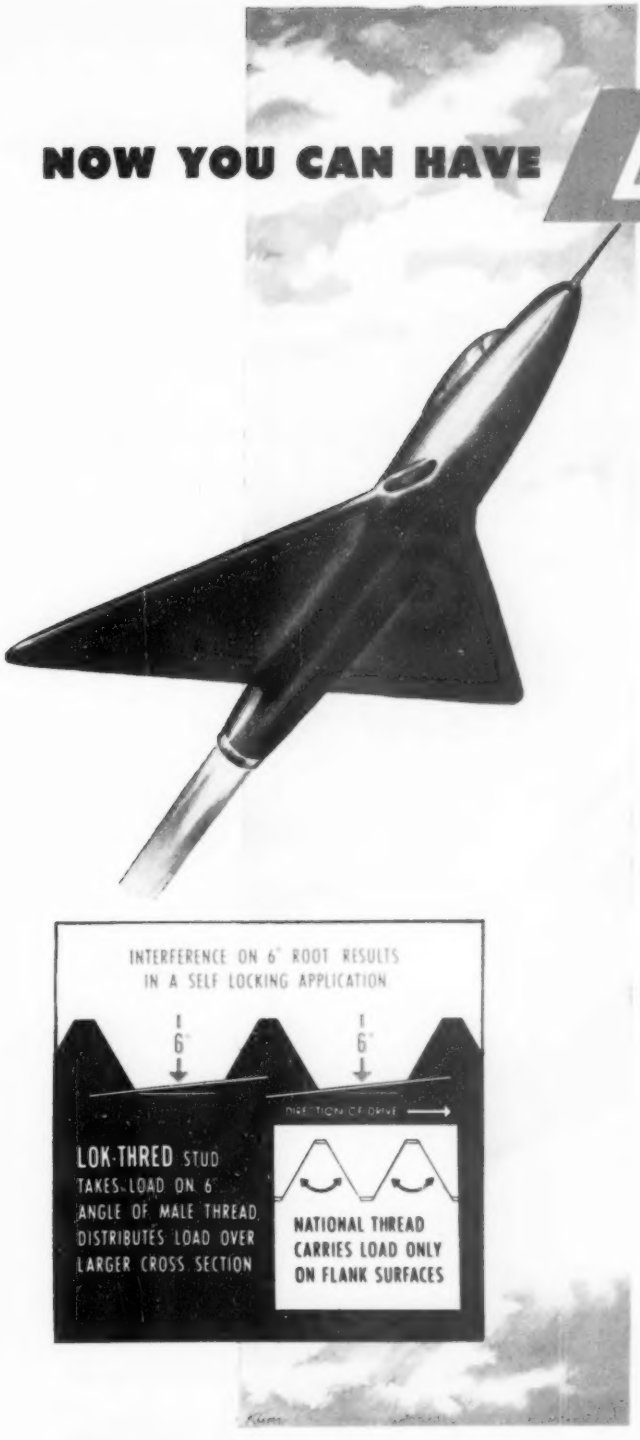
For the first nine months of 1953, J&H net income was $1,026,300, compared with $769,400 for the corresponding period of 1952. Company sales of $28,926,800 for that period compared with the year-ago figure of $25,603,200.



Flight Refueling 'Kit'

Self-contained probe-and-drogue inflight refueling package is said to make it possible to convert bomber to tanker in half an hour. The hose reel-funnel-drogue kit is hoisted from its dolly and installed in the plane's bomb bay. Maker of the equipment is Flight Refuelling, Ltd., Tarrant Rushton Airfield, Blandford, Dorset, England.

NOW YOU CAN HAVE LOK-THRED



INTERFERENCE ON 6° ROOT RESULTS IN A SELF LOCKING APPLICATION
6°
6°
DIRECTION OF DRIVE
LOK-THRED STUD TAKES LOAD ON 6° ANGLE OF MALE THREAD. DISTRIBUTES LOAD OVER LARGER CROSS SECTION
NATIONAL THREAD CARRIES LOAD ONLY ON FLANK SURFACES

Self-Locking Studs, Bolts and Screws that Won't Shake Loose... Actually Tighten in Service!

Proved by 5 years of use in the aircraft industry, LOK-THRED studs, bolts and screws answer the need for safe, practical threaded fasteners that can withstand severe vibration and continued stress—without loosening.

Secret of LOK-THRED is the interference created by the 6° angle at the root of the male thread. Providing positive metal-to-metal contact, the LOK-THRED stud reforms the receiving thread, locks tight—permanently!

Only standard tools are needed; selective fitting is unnecessary. LOK-THRED fasteners can replace standard fittings already in use—are fully re-usable themselves.

If yours is a special stud-locking problem, let our engineers solve it for you—with LOK-THRED!

Write for LOK-THRED Data Folder —

American Standard Products *Incorporated*

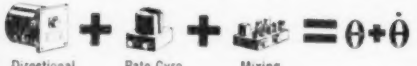
3030 MAIN STREET · HARTFORD, CONNECTICUT ·

THREADED PARTS FOR THE AIRCRAFT INDUSTRY

new instrumentation discovery!

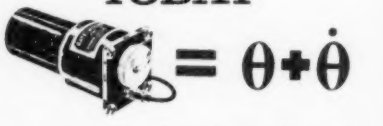
This is the story!

Yesterday



Directional Gyro Torquer Cager Pickoff | Rate Gyro Pickoff Damper | Mixing Circuitry

TODAY



	Reliability	Drift	Current	Weight	Cost
yesterday	.950	.5/Min	.3 amps	12 lbs.	
today	.999	.1/Min	.3 amps	3 lbs.	

This new invention, Summers PAR (*P*ostion *A*nd *R*ate) GYRO* for the first time makes available on a single pickoff the algebraic sum of both the angular position and the rate of change of angular position of air, land, or water craft. This simple pickoff is the on-off type, and is easily linked mechanically to the control surface actuator. Or PAR GYROS may be supplied with either an inductive or potentiometer pickoff where mechanical follow-up is not practical. Parameters are easily adjustable over a wide range to attain stability with ease.

Heretofore, even an entire series of costly instruments failed to insure this goal with equal reliability.

Both weight and cost of the PAR GYRO are about one-fourth of the weight and cost of the apparatus it obsoletes.

Now available in production quantities.

* Patent applied for

SUMMERS GYROSCOPE COMPANY

2328 BROADWAY • SANTA MONICA CALIFORNIA

Representatives:
H. A. Webb, 34 Mann Street, Fairborn, Ohio
W. A. Laukaitis, Suite 724, Cafritz Building, 1625 Eye Street N. W., Washington, D. C.
George E. Harris & Co., Inc., 1734 No. Hillside, Wichita, Kansas

NEW AVIATION PRODUCTS

Anti-Static Coating Rids Glass, Plastic of Charge

An anti-static coating for canopies and radomes is under development on the West Coast. It is designed to prevent communications failures due to accumulated electrical charges.

Although Air Force tests have not been completed, American Latex Products Corp. plans to start production soon. American Latex and Lockheed Aircraft Corp. collaborated on development of the new substance.

The coating conducts accumulated precipitation charges from glass or plastic areas to the fuselage. The total charge then may be eliminated by the customary wick installation or thermal-jet discharge.

Its special characteristics are said to include electrical resistance of 1-10 megohms per sq. in., optical transparency, water resistance and lack of hazing. It is a material easy to handle, does not require use of specialized personnel, and is adaptable to field service conditions, American Latex reports.

To prepare surfaces for the conducting film, they are chemically cleaned and coated with a uniform film primer. The compound is then applied as a dry powder to a velvet mitt which serves as an applicator. With a light oscillatory motion the powder is transferred to the prepared surface. The conductivity of the coating is at a minimum when first applied but a light buffing with the applicator brings the resistance to the required level, the company says.

American Latex Products Corp., 3341 El Segundo Blvd., Hawthorne, Calif.

Pressurized Invader

One of the first pressurized conversions of a military aircraft to executive use is this Douglas B-26 Invader. (Original designation at time of construction was A-26B). The conversion, whose total cost is estimated at $500,000, is pressurized with AiResearch equipment to give a cabin altitude of 7,500 ft. at an outside altitude of 17,500 ft. Major rework of the fuselage and cockpit had to be accomplished to make the aircraft pressurizable. Frames had to be strengthened, pressure bulkheads installed and heavier skin used with sealant to make joints airtight. Other changes include a completely revamped heating system and installation of R2800C engines with Hamilton-Standard, reversible-pitch propellers. The interior ceiling and walls are covered with hand-tooled fine grain leather. A black wool pile rug is on the floor. Plane has accommodations for pilot, co-pilot and six passengers. Cabin has extra-large windows for good visibility, and an observation dome. The plane has a range of 3,400 miles (using two drop tanks to give a total fuel capacity of 1,600 gal.). Speeds at 17,500 ft. are quoted as 340 mph. cruise and 400 mph. maximum. Grand Central Aircraft, Glendale, Calif., handled the conversion for the Brown Paper Co., Monroe, La.

Booster Pump Operates With Remote Reservoir

Vickers, Inc., announces production of a new hydraulic fluid booster pump, Model AA 15500, for use where hydraulic reservoirs are located a considerable distance from system pumps or where altitude problems exist.

Reservoir-mounted and hydraulic-motor-driven, unit provides reservoir oil under pressure to overcome line losses and assures adequate supply of oil for main system pumps. When pump is used it is not necessary to pressurize reservoir, Vickers notes.

The pump is combined with company's conventional 3,000-psi. MF-3906 motor. Fluid is bled off main hydraulic system to power motor which turns pump. Gravity feeds reservoir oil into first stage of boost unit, a centrifugal pump. Centrifugal section then passes oil to vane pump section which generates pressures up to 100 psi.

Vickers reports that pump can generate hydraulic power varying from 5 gpm. at differential pressure of 100 psi. to 35 gpm. at differential pressure of 18 psi.

Weight of pump and motor combination is 9.1 lb. Depending on motor size used, delivery from pump is claimed to be 23 to 33 times greater than fluid flow through driving hydraulic motor.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich.

Mica Switch Housing Formed to Precise Size

Molded Mycalex switch housing for airborne applications withstands repeated arcing and can be produced to precise dimensions. The manufacturer, Mycalex Corp. of America, says units are now in production for use by major aircraft manufacturers.

Mycalex 410X glass-bonded mica is the formulation used in the switch housing. The company claims no carbon path is formed in tests with the material. Other features listed for this insulating material are high dielectric strength, zero moisture absorption, and permanent dimensional stability at temperatures up to 650F.

Mycalex Corp. of America, 60 Clifton Blvd., Clifton, N. J.

Attachment Makes Manual Honing Machine Automatic

A stroking and timing attachment which will convert manually operated horizontal honing machines into automatic units has been announced by National Pioneer Co.

Manufacturer states that this unit will enable operator to increase his manual production on one machine by one-third or permit him to operate sev-

triple threat

Changing temperatures, vibrations, and accelerations affect the operation of all instruments. In spite of these variables, our products produce the right answers because they are properly designed.

- AIRCRAFT INSTRUMENTS AND CONTROLS
- OPTICAL PARTS AND DEVICES
- MINIATURE AC MOTORS
- RADIO COMMUNICATIONS AND NAVIGATION EQUIPMENT

Current production is largely destined for our defense forces; but our research facilities, our skills and talents, are available to scientists seeking solutions to instrumentation and control problems.

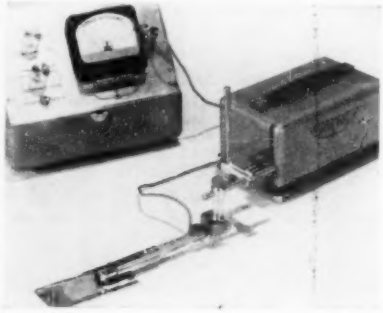
kollsman INSTRUMENT CORP.

ELMHURST, NEW YORK • GLENDALE, CALIFORNIA • SUBSIDIARY OF Standard COIL PRODUCTS CO., INC.

eral machines at one time.

Attachments are available for practically all horizontal units, and special attachments will be made on order. Manufacturer states that even spherical honing can be done economically with an attachment.

National Pioneer Co., 1134 Nebraska Ave., Toledo 7, Ohio.



Mechanical Tracer for Surface Roughness Unit

A new mechanical tracing accessory for use with the Surfindicator—an instrument for measuring surface roughness—is being marketed by Brush Electronics Co.

Called the Brush Motor Drive, Model BL-114, the unit provides mechanical movement of the Surfindicator pickup along a surface being inspected. Manufacturer says it extends usefulness of the basic Surfindicator beyond range which is practical with hand operation. It has reciprocating stroke, with length adjustable from 2⅝ in. to less than ⅛ in. Stroke speed is ⅛ in. per second.

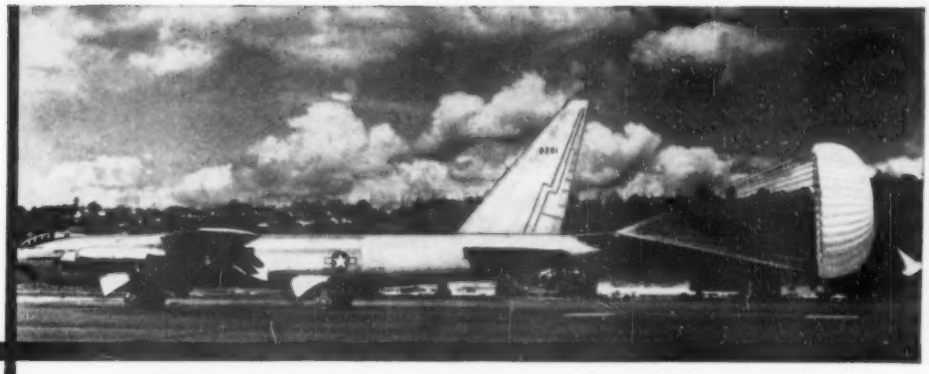
Brush says the accessory's instantaneous-reversal, constant-speed and low-vibration-level features insure accurate surface roughness measurements.

Brush Electronics Co., Equipment Div. SP, 3405 Perkins Ave., Cleveland 14, Ohio.

ALSO ON THE MARKET

Set-up studs for tool and die work are available in diameters of ¼, 5/16, ⅜, ½, ⅝, ¾, ⅞ and 1 in., with lengths in ¼-in. multiples up to 12 in. Units are made of stressproof, heat-treated alloy steel with tensile strengths of over 125,000 psi.—Jergens Tool Specialty Co., 712 East 163rd St., Cleveland, Ohio.

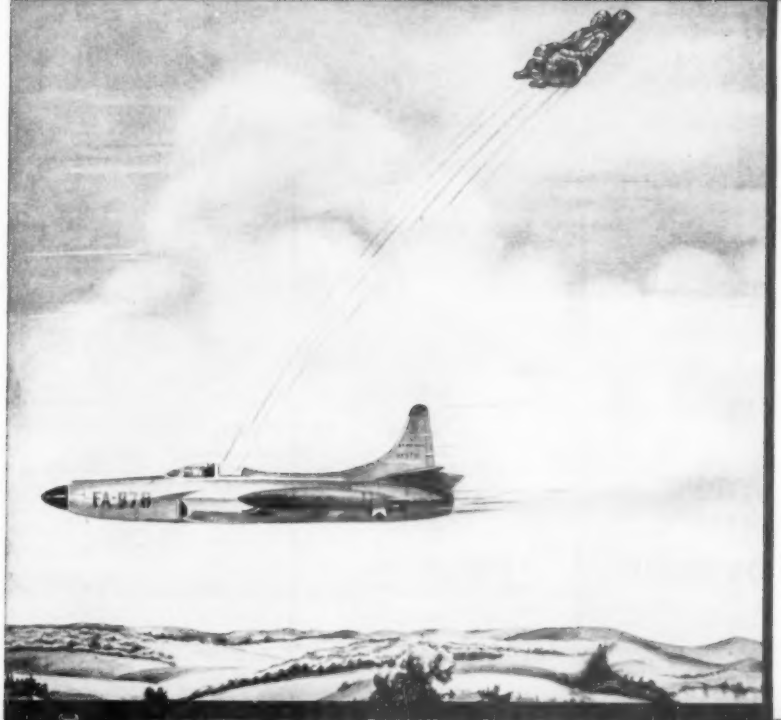
Custom-molded silicone rubber parts for aircraft, automotive and electrical equipment, produced to commercial and government specifications, are available, with the manufacturer taking complete responsibility from blueprint to finished product.—Stillman Rubber Co., 5811 Marilyn Ave., Culver City, Calif.



Pioneer Ribbon Parachute used as air brake for Boeing Jet Bomber.

PIONEER PARACHUTES *give amazing* JET *performance!*

In aviation, the miracles of yesterday are routine today. Pioneer Ribbon Parachutes used for air brakes on jet planes as well as many other applications; the New P7-B* Guide Surface Personnel Parachutes are but two of the many types made by Pioneer which have established Pioneer's reputation as the world's Leading parachute designers and manufacturers!



Jumper descends straight down, landing on his feet. The P7-B Parachute makes the difference.

PIONEER PARACHUTE COMPANY, INC.

MANCHESTER, CONNECTICUT, U. S. A.

CABLE ADDRESS: PIPAR.

*Patents applied for in U.S. and principal countries throughout the world.

Aeroquip

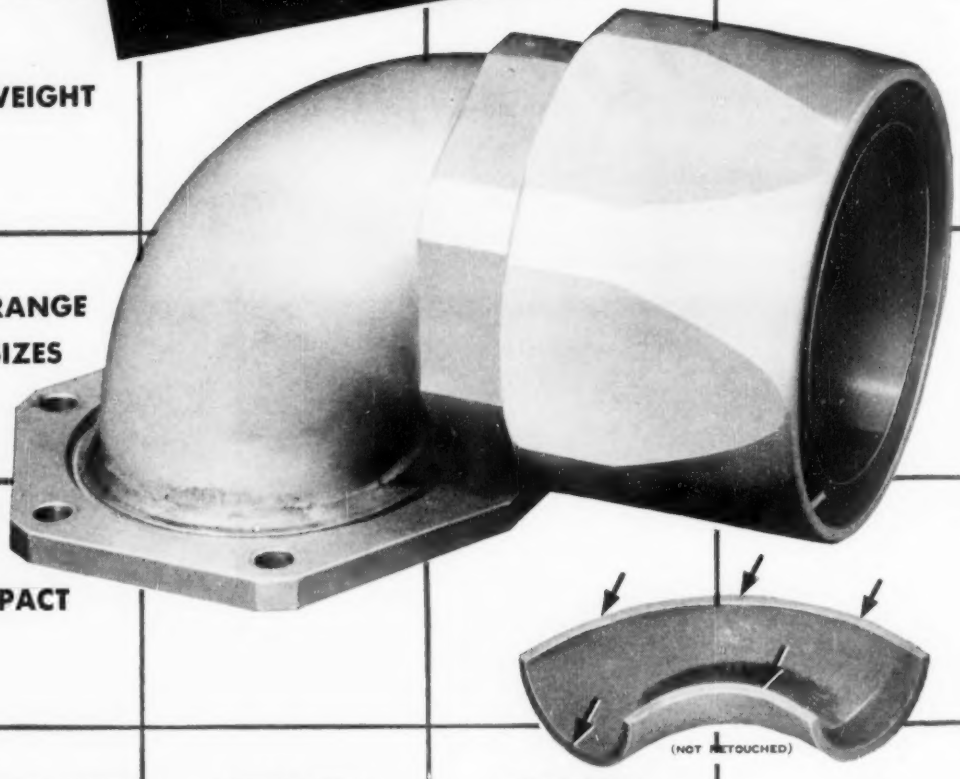
REG. TRADE MARK

ALUMINUM ELBOWS

LIGHTWEIGHT

FULL RANGE OF SIZES

COMPACT



(NOT RETOUCHED)

AN SWIVEL NUT AND FLANGE TYPES

AEROQUIP QUALITY THROUGHOUT

UNIFORM WALL THICKNESS

FULL FLOW

AEROQUIP CORPORATION

AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. • Portland, Ore. • Wichita, Kan.

IN CANADA: Prenco Progress and Engineering Corporation Ltd., Toronto

IN ENGLAND: Super Oil Seals & Gaskets, Ltd., Birmingham

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

LETTERS

Cockpit Visitors

With reference to Capt. Robson's article of Dec. 7, 1953, on cockpit authority, I am a pilot in the U. S. Marine Corps and have flown several thousand hours of transport time in R5Cs and R5Ds.

This pilot feels that the subject of who gets up to the cockpit should be a command responsibility and not one laid down by law. The very people who are in a position to get "cockpit cards" are the ones that will give a "captain" the most trouble. It is felt if the high powers have enough faith in a man to make him a captain then he should be able to rule supreme while airborne and not to be bothered too much by petty rules of this sort.

Good going, Capt. Robson, and let's hope your article on this subject will bear fruit with CAB.

JOHN D. CURD, Maj., USMC
Cherry Point, N. C.

Napier Capacity

I notice that in AVIATION WEEK for Oct. 26 there is a mention of our activities on page 11. We appreciate publicity, but we do not care for the statement that "Napier has no available floor space after setting up licensed production lines for the Rolls-Royce Avons." This is not correct and conveys a misleading impression of the true position. We already have pre-production Eland and Nomad engines in hand.

It is true that we are building Rolls-Royce Avons at Netherton, but it should be realized that here we have a large modern factory specially equipped for the production of gas turbine engines, and that there is no question of our having taken on a subcontract at the expense of our ability to produce engines of our own design in quantity when we are ready to do so.

If you could arrange to publish a note making the position clearer and correcting the impression that we cannot produce our own engines, I would be glad.

A. V. BELLAMY, Publicity Mgr.
D. Napier & Son, Ltd.
London, W. 3, England.

Instrumentation

For years we who are in repair and maintenance of aircraft equipment have followed your editorials and crusades for improvement of aviation with considerable interest and approval. . . .

We are most anxious to make our particular field of service a vital and contributing factor to safety in flight. . . . The equipment phase of aircraft has grown tremendously in size and importance. With it has come a proportionate necessity for absolute dependability in the matter of maintenance and repair of that equipment. Hence our organization. And in establishing NAAI (National Assn. of Aircraft Instrumentation, Inc.), we selected the term "Instrumentation" and defined it as including: aircraft and guided missile instruments,

PRODUCERS OF AIRCRAFT AND INDUSTRIAL INVESTMENT CASTINGS

When You Specify

PRECISION INVESTMENT CASTINGS

BE SURE TO SPECIFY

MISCO

MISCO PRECISION CASTINGS

- ELIMINATE EXPENSIVE MACHINING OPERATIONS
- PERMIT LARGE QUANTITY PRODUCTION IN MATERIALS DIFFICULT OR IMPOSSIBLE TO MACHINE
- MAKE POSSIBLE REPRODUCTION OF INTRICATE SHAPES AND DESIGN IN FINE DETAIL
- MAINTAIN DIMENSIONAL ACCURACY DOWN TO PLUS OR MINUS .005 PER LINEAR INCH
- ACHIEVE 70 TO 80 MICROINCH SURFACE FINISH

PIONEERS IN CARBON
STAINLESS AND HIGH-TEMPERATURE
PRECISION CASTINGS

Misco Precision Casting Company
WHITEHALL, MICHIGAN
PLANTS AT: DETROIT AND WHITEHALL, MICHIGAN
OFFICES IN PRINCIPAL CITIES
TELEPHONE: WHITEHALL 2-1515

Housing intricate electronic equipment for airborne use to withstand shocks and forces which might cause malfunction often presents problems as difficult as the design of electronic systems themselves.

Take one example—a pressurized external housing capable of being flown in the trans-sonic speed range and meeting all environmental trials. From wind tunnel tests to complete tooling and manufacture, Edo relieved the electronics manufacturer and aircraft builder of the many problems involved.

If you have an external stores housing problem, no doubt our vast experience in both electronics and aerodynamics can help you.

Edo
Since 1925
CORPORATION
COLLEGE POINT, NEW YORK

HAVE YOU MOVED?

If you've moved recently or are planning to change, let us know now, so copies of AVIATION WEEK will continue to reach you promptly.
Use this handy coupon or a postcard.

Please change the address of my AVIATION WEEK subscription.

Name .....
OLD address .....
City, State .....
NEW address .....
City, State .....
New company connection .....
New title or position .....

MAIL TO: AVIATION WEEK,
Subscription Service,
330 West 42nd Street
New York 36, N. Y.

accessories, and radia, radar, photographic, oxygen, electrical, electronic and telemetering equipment.

By coincidence this association was organized on the West Coast, arising spontaneously among firms and corporations realizing the importance of their service and desiring earnestly to achieve the maximum benefit to aviation. Most certainly this same thought is in the minds of many conscientious business men across the country as they seek to improve their standards and increase their facilities.

Consequently, the association is national in scope and character and seeks to combine the interests and purposes of all qualified service organizations, within the term "Instrumentation." For that reason too, the first national meeting and election of the first national board of directors is being delayed, as well as the organization of the various divisions, in order that representative and outstanding companies in all parts of the United States may have an opportunity to participate as charter members.

Lloyd W. Halvorson
Executive Secretary
Natl. Assn. of Aircraft
Instrumentation, Inc.
3411 Tulare Ave.
Burbank, Calif.

TEAL to Tahiti

We have, over the years, learned to accept Aviation Week as an authoritative and interesting magazine. We regard it in this part of the world as a most useful and informative encyclopedia of events and we look forward regularly to its receipt.

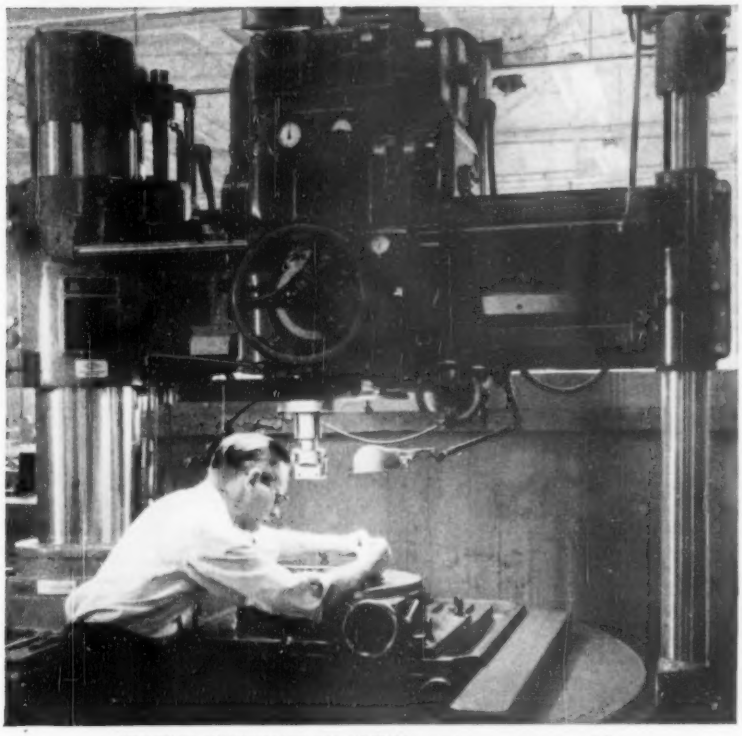
Our concern may therefore be appreciated when, on reading your issue of July 6, we discovered some quite inaccurate statements by Barron Fredericks relative to air services to Tahiti. Mr. Fredericks was discussing a new operator known as South Pacific Airlines. You do, I am certain, make every endeavour to check the accuracy of the statements published in Aviation Week, but because I feel sure on this occasion that a genuine error has been made, I am writing to point out what in fact is the real position in respect to air services to the remote islands of French Oceania.

Mr. Fredericks refers to "an occasional air service from Honolulu." While in point of fact he is correct if he is referring to a direct service between Honolulu and Tahiti, he nevertheless is well astray if his statement is to be given the general interpretation which its words convey, as Tasman Empire Airways, Ltd. (TEAL) has been operating a regular service from New Zealand to Tahiti via Fiji since December 1951. Though the initial frequency of this service was one flight every four weeks, in June 1952 the frequency was increased to one flight every two weeks.

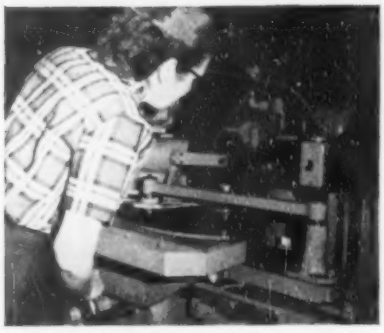
Passengers from the United States and Honolulu join the TEAL services at Fiji, to which point they are carried by the regular services of such major international operators as BCPA, PAA and CPAL. Thus you will agree without doubt, that it is misleading and inaccurate to make reference to "an occasional air service from Honolulu."

Like the airlines just mentioned, TEAL

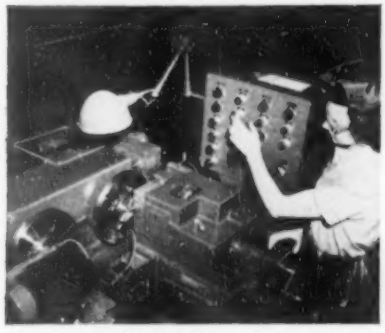
DEFENSE PRODUCTS *of High Quality at Low Cost* DELIVERED ON TIME



OERLIKON PRODUCTION JIG BORING machine — using accurately ground spacers in two directions in the horizontal plane — performs high-precision toolroom quality work with semiskilled help.



SPECIAL BALL-GRINDING machine developed by AC for grinding a ball-shaped end on a shaft to very close tolerances and extremely fine finish.



SPECIAL TWO-SPINDLE Fellows Gears Generator cuts a flat spiral groove in squaring function gear on one spindle while shaping teeth on the other.

Machine Tools Worth Millions!

GM GENERAL MOTORS GM GOOD MANAGEMENT AC KNOW HOW

Would you like employment offering travel and educational opportunities? We invite graduate electronic, mechanical, servo and field service engineers to write our Salary Personnel Department for booklet "You and Your Future."

Machine tools are the "good right arm" of American industry. At AC, there are batteries of the most modern precision tools devised by man. Practically every phase of the machine-tool industry is represented in the more than 20,000 units that are part of AC's facilities dedicated to both defense and civilian production.

The need to hold machined parts to extremely close tolerances is a readily accepted fact at AC. For example, a thread grinder at AC turns out fine surface finish threads, some of which have a maximum tolerance of fifty-millionths-of-an-inch error from one thread to the next.

Precision production is a byword at AC . . . and the same talents and tools that are now producing electro-mechanical devices for military needs might be readily applied to your defense-production problems. Why not investigate?

AC is now producing — in volume — these complex, high-precision, electro-mechanical devices for the Armed Forces:

- **"A" Series Gun-Bomb-Rocket Sights**
- **A-1A Bombing Navigational Computers**
- **T-38 Fire Control System for the Skysweeper**

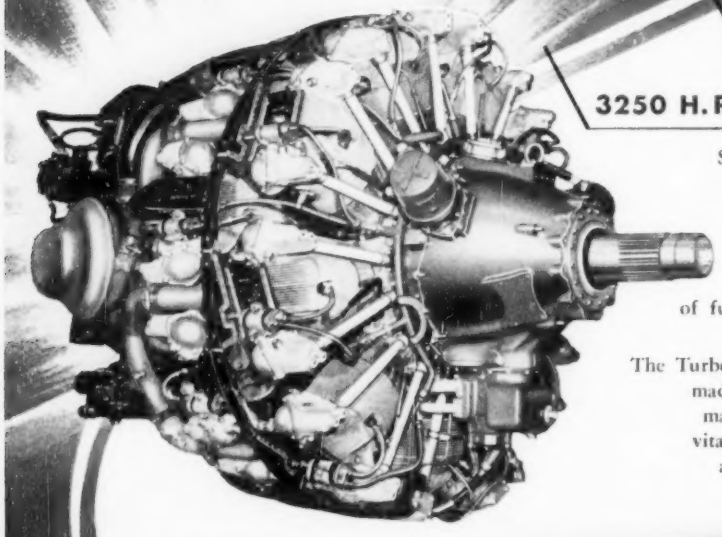
AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION
FLINT, MICHIGAN

The World Famous

TURBO COMPOUND

...now rated at

3700 H.P.



Since its introduction, the Turbo Compound engine has been progressively developed to higher output. Today, at its 3,700 h.p. military rating, it develops more power per pound than any other engine of its type . . . more power for a given amount of fuel than any other engine in the world . . . with greater potential for the future.

The Turbo Compound's outstanding performance has made it the choice of the military services for many types of high-speed, long-range aircraft vital to our national defense. And 23 leading airlines have specified this engine for faster, more economical world-wide operations.

JOBS FOR:
ENGINEERS
ACCOUNTANTS
TECHNICIANS

CURTISS-WRIGHT

CORPORATION • WOOD-RIDGE, N. J.

World's Finest Aircraft Engines

is a member of the International Air Transport Assn. It is New Zealand's international airline and a scheduled carrier. The Tahiti service, in common with all TEAL services, has maintained a high record of regularity. Since its inauguration in December 1951, only two off-schedule flights have been experienced.

TEAL's fleet consists of four Mark 4 Solent flying boats specially designed and built for our operation and completely superior in operating and other characteristics to all other Solent flying boats. The Mark 4 Solents are licensed to carry 45 passengers and they comply with international operational requirements in all respects. The TEAL Coral Route service to Tahiti is operated by these aircraft.

Mr. Fredericks refers to "three connections." There is of course only one and this is at Fiji. Reference to the map on the back of the timetable included with this letter should clarify the position. It will also indicate clearly the 8,000 unduplicated route miles of network over which TEAL operates.

It illustrates how TEAL Solents connect with all flights from Honolulu. At Fiji passengers have the choice of making a direct connection to Tahiti or of using stopover privileges to see Fiji and Samoa. At this latter wayport the Solents remain 14 hours and passengers may continue by the same flight or stop over to take the next flight if additional time is required in Samoa for local sight-seeing and vacationing. At all stopping points TEAL provides complimentary hotel accommodations on its through flights.

I have endeavoured to describe to you the true position in respect of air transportation to Tahiti. Naturally anything inaccurate published in respect of this service could detract from its popularity. I am hopeful therefore that you will devote some space to correcting what previously has been published in error.

Mr. Fredericks is not exaggerating when he refers to the "scenic and recreational lure of Tahiti." It holds wonderful tourist appeal, but contrary to what Mr. Fredericks says, is only 52 hours from Honolulu, not 70 hours as he indicates.

J. W. Veale, Asst. Gen. Mgr.
Tasman Empire Airways, Ltd.
Auckland, New Zealand

Praise

I congratulate you for the excellent choice of material, its digested presentation and the world wide coverage of your news service; it permits a busy executive to get acquainted with the latest technical information in many aspects of the aviation business in a very short time, an invaluable advantage in this ever-growing industry.

Rafael Barvo, Director of Operations
Aerovias Nacionales de Columbia Avianca
Bogota, Colombia

A word of thanks for the splendid piece on our jet project. It was written in the usual high standard which we have come to expect from your publication.

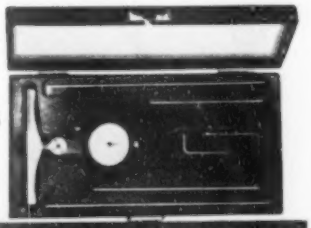
J. Peter Brunswick
Director of Public Relations
El Al Israel Airlines, Ltd.
37 W. 57th St.
New York 19, N. Y.

Reliant
ADJUSTABLE
depth
and groove location
GAGE

- Fully adjustable from 0" to 6¾" without changing rods.
- Positive and accurate inspection of depths of holes, slots, shoulders and recesses.
- Light and easy to operate.

Write for Catalog 53B

Reliant Industries
4947 Firestone Boulevard
SOUTHGATE, CALIFORNIA



ALSO MANUFACTURERS OF PRECISION GAGES FOR CHECKING GROOVE DIMENSIONS FOR "O" RINGS AND SNAP RINGS

ACCURACY • DEPENDABILITY • VERSATILITY

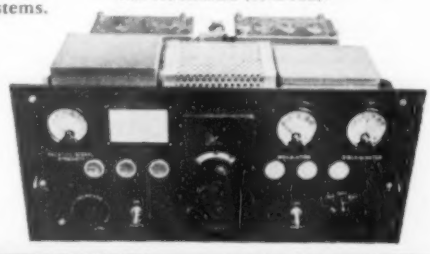
RREP 842-C FM RECEIVER

A double-conversion FM Receiver covering the 215 to 235 mcs band which meets the highest standards for quality, and including numerous special circuits to make tuning simple and positive and assure long, dependable operation.

This receiver forms an integral part of the RREP Telemetering system, where it is used to receive FM/FM signals in the 215-235 mcs range with a deviation of ±125 kcs, and to demodulate these signals for application to an amplifier, discriminator units, and/or recording systems. May be used similarly in Radio Control systems or in laboratories wherever accurate, dependable reception of FM signals in the 215-235 mcs range is required.

FEATURES

- Sensitivity—2.5 microvolts or better at center frequency, and 5 microvolts or better at ±150 kcs deviation.
- Signal-to-noise ratio of 60 db for 10 microvolts input at ±150 kcs deviation.
- Voltage-regulated B-plus circuits for Oscillator and Reactance Modulator.
- A.F.C. circuit maintains control up to ±800 kcs from mean set frequency based on a nominal deviation of ±125 kcs.
- Output signals flat within 0.5 db from 100 cps to 100 kcs.
- Three front panel meters—Discriminator Balance, Relative Signal Strength and Modulation (deviation).

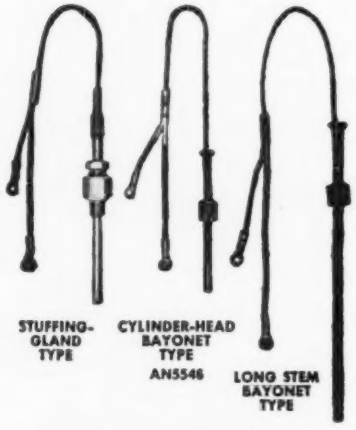


RREP
RAYMOND ROSEN ENGINEERING PRODUCTS, Inc.
32nd & Walnut Streets • Philadelphia 4, Pa.

LEWIS
Resistance Bulbs

for Aircraft

FOR BEST RESULTS USE THESE ACCURATE, RESPONSIVE, STURDY TEMPERATURE-SENSING ELEMENTS WITH LEWIS RESISTANCE-TYPE THERMOMETERS.



Free-air bulb is designed for flush mounting with the wing surface.

AN5525-1 and AN5525-2 standard type with 5/8—18 threaded head, hermetically sealed. These bulbs exceed the response and operating temperature requirements of specification AN-B-19.

Stuffing-gland Type with 1/8 NPT threads, is suitable for measuring liquid temperatures.

Cylinder-head Bayonet Type has probe dimensions similar to the familiar bayonet thermocouple and is used with same AN4076 fitting. Sensitive silver tipped element and sturdy spring insure fast, accurate temperature indication.

Long-stem Bayonet Type, used with AN4076 fitting, is similar in construction to the cylinder-head type except probe is 3 3/8 inches longer, for special applications.

In addition to those illustrated, we manufacture bulbs for special applications to individual specifications.

THE LEWIS ENGINEERING CO.
Manufacturers of Complete Temperature Measuring Systems for Aircraft
NAUGATUCK, CONNECTICUT

FINANCIAL

Recognition of Air Transport Grows, as . . .

Presidents Join Corporate Boards

The election of C. R. Smith as director of the Chase National Bank of the City of New York highlights the increasing recognition accorded chief executive officers in the airline industry.

Chase, one of the three largest banks in the United States (if not in the world), has attracted to its directorate leading representatives of finance, industry and commerce. Accordingly, the selection of the American Airlines president to this bank's board of directors can be viewed as a tribute to the position established by the carrier and the stewardship of its management.

▶ **Tribute to Aviation**—Similarly, and in equal measure, the selection of other airline presidents to the directorates of banks and industries in their communities is a reflection of the character achieved by their companies, themselves, and the air transport industry as a whole. Such recognition is fairly widespread and has been underway for some time, picking up momentum recently.

In an exclusive compilation, AVIATION WEEK presents in the accompanying table, a listing of bank and other corporate directorships held by airline presidents.

It can be seen that no less than nine presidents of airlines are represented on the boards of banks and other public corporations throughout the country. For the most part, such representation in the financial institutions or other corporations is in the community in which the main office of the airline is located.

An early airline selection for a bank board was W. A. Patterson, president of United Air Lines, when he was invited to join the directorate of the City National Bank & Trust Co., one of the larger Chicago banks. Significantly, Mr. Patterson was recently elected a director of Westinghouse Electric

Airline Presidents And Their Directorships

Airline	President	Directorships
• American	C. R. Smith	Chase National Bank, New York
• Braniff	T. E. Braniff	Republic National Bank, Dallas
• Delta — C & S	C. E. Woolman	Citizens & Southern National Bank, Atlanta
• Eastern	E. V. Rickenbacker	Foremost Dairies, Inc., Jacksonville
• National	G. T. Baker	First National Bank, Miami
• Pan American	J. T. Trippe	Metropolitan Life Insurance Co., Chrysler Corp., New York, Fidelity & Deposit Co., Baltimore
• Pioneer	Robert J. Smith	First National Bank, Dallas Federal Reserve Bank, 11th District.
• TWA	Ralph S. Damon	New York Trust Co., New York, Long Island Trust Co., Long Island City, Guardian Life Insurance Co., New York, Bankers Securities Corp., Philadelphia, Frontier Industries, Inc., Buffalo, Goodyear Tire & Rubber Co., Akron, New York Telephone Co., New York, Sheraton Corp. of America, Boston, Strategic Materials Corp., Buffalo, Veeder Root Corp., Hartford
• United	W. A. Patterson	City National Bank & Trust Co., Chicago, Insurance Co. of No. America, Chicago, Mutual Benefit Health Accident Assn., Omaha, Stewart Warner Corp., Chicago, Westinghouse Electric Corp., Pittsburgh

SOURCE: Poor's Register of Directors (except C. R. Smith and R. S. Damon).

15 times longer life!

...for this TWIGG-BUILT turbine inlet casing

Sections of Type 310 stainless steel turbine inlet casing, formerly arc-welded, are now NICRO-BRAZED. This latest atmospheric-controlled brazing process gives the assembly *15 times the service life* formerly experienced.

Nicro-Brazing is typical of the advanced metal-working techniques employed by TWIGG in fabricating *stronger, lighter, precision-built* assemblies to meet exacting performance requirements.

MANUFACTURING FOR AIRCRAFT:
combustion chambers, transition liners, turbine casings, tail cones, afterburners, burner supports, brackets, and other components.

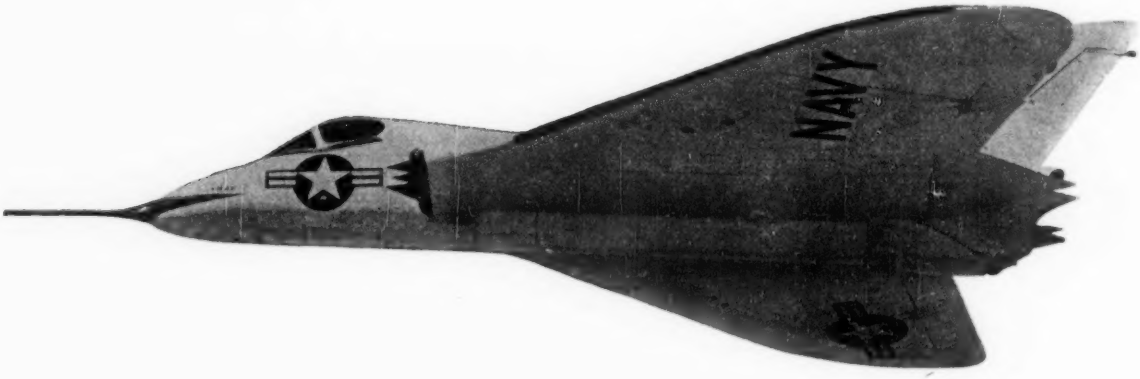
TWIGG CAN DO IT... *for you!*

Whatever your product requires . . . precision fabrication, lightness with strength, heat or corrosion resistance . . . call on Twigg! Write for colorful new brochure, "Twigg Can Do It," illustrating our complete facilities for fabricating and machining stainless steel, aluminum, titanium and other high capacity metals.

TWIGG INDUSTRIES INC

DEPT. A-12, BRAZIL, INDIANA

Who designed and built the Afterburner Temperature Control for the record-breaking Douglas F4D Skyray?



The Afterburner Temperature Control on the Westinghouse J 40 turbojet which powered the history-making U. S. Navy's Skyray is a development of the Aircraft Products Division of Manning, Maxwell & Moore, Inc.

Our contribution to the Skyray's official average of 753.4 mph culminates five years of concentrated experience in designing and producing simple, reliable automatic afterburner and variable area control systems for jet engines. This latest application of our aircraft products again proves the validity of our unique design technique. We emphasize system design which adheres to developed components whenever practicable — design which requires no modification of the basic jet engine governing system.

We are confident that our engineering counsel, extensive manufacturing and test facilities can be of real service to you in building better and safer jet aircraft. Your inquiry is invited.

MANNING, MAXWELL & MOORE, INC.

AIRCRAFT PRODUCTS DIVISION • STRATFORD, CONN. • DANBURY, CONN. • INGLEWOOD, CALIF.

OUR AIRCRAFT PRODUCTS INCLUDE: TURBOJET ENGINE TEMPERATURE CONTROL AMPLIFIERS • ELECTRONIC AMPLIFIERS PRESSURE SWITCHES FOR ROCKETS, JET ENGINE AND AIRFRAME APPLICATIONS • PRESSURE GAUGES THERMOCOUPLES • HYDRAULIC VALVES • JET ENGINE AFTERBURNER CONTROL SYSTEMS.

Corp. whose main offices are in Pittsburgh and a point not now served by United. This represents a high tribute to United's chief executive from one of the country's leading industrial enterprises, with total resources of almost $1 billion.

The largest number of bank and corporate directorships belongs to Ralph S. Damon, president of TWA. Among his representations are two banks (a major one in New York City and one in the community of his residence), plus two other financial institutions, along with leading industrial enterprises such as the Goodyear Tire & Rubber Co., New York Telephone Co., and the Sheraton hotel chain.

► **Two-Way Street**—These airline affiliations with financial and other corporate organizations are a two-way affair. The airlines' presidents serving as directors of these institutions have been able to contribute much of their experience and the lessons learned from the air transport business to the diversified and broader activities of the companies beyond their primary field.

By the same token, by being exposed to these broader facets found in top financial and other industrial corporate affairs, valuable approaches successfully developed elsewhere can be applied to good advantage in the airline industry.

The fact nevertheless remains that the selection of airline presidents to serve on the boards of banks and other large corporations reveals the importance and substance of the air transport industry in the economy of the country. —Selig Altschul

Defense is 1/5 of GM's Business

The relative importance of defense production to General Motors Corp. was revealed publicly for the first time in that company's prospectus upon its recent marketing of $300 million in 3¼% debentures.

The aircraft products delivered by General Motors in recent years have been largely represented by jet aircraft engines, radial aircraft engines, propellers, fire control systems for anti-aircraft guns, aircraft bombing navigational computers, and radar equipment.

Other defense products include tanks, tank transmissions, military trucks, amphibious cargo carriers, shells, rockets, cannons and gun-bomb-rocket sights. In addition to these strictly defense products, General Motors also delivered substantial quantities of commercial items to the government for use by the military establishment. Sales of these commercial items to the government are classified as defense sales.

It can be seen that from an average of about 3% from 1948-1950, defense production rose to 19% in 1952, and sales reached $1,452 million. —SA

GM Net Sales, 1948-1953

Year	Net Sales		Percent of Defense to Total
	Defense Products	Total All Products	
	(Millions omitted)		
1948	$144	$4,702	3%
1949	189	5,701	3
1950	209	7,531	3
1951	761	7,466	10
1952	1,452	7,549	19
1953 (9 mo.)	1,398	7,931	18

at 9000 feet over Mexico City — on one engine

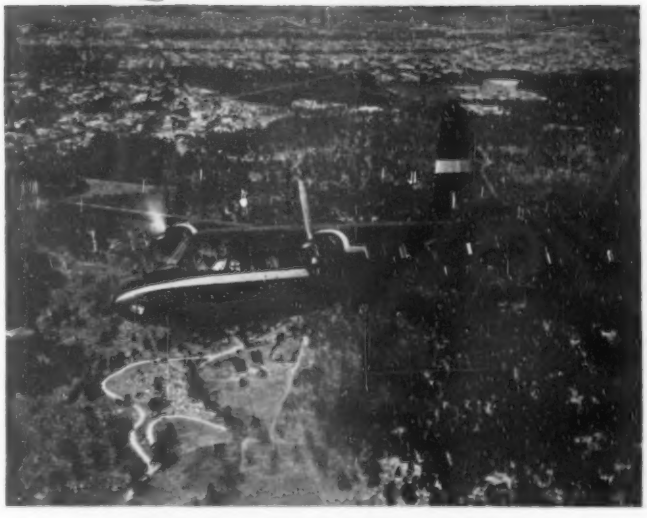
A HARTZELL Propeller Made it Possible

"The use of Hartzell full-feathering propellers is a prime factor in the Aero Commander's ability to meet this high standard of performance."

That was Aero's comment on the test, pictured at the right, in which an Aero Commander had no difficulty maintaining altitude with one propeller feathered while flying at 9000 feet over tropical Mexico City.

The Hartzell full-feathering, constant-speed propeller is the simplest model available, and the lowest priced. No auxiliary equipment other than a governor are required for its operation.

Write today for complete details on this propeller. If you fly a single-engine airplane, ask about the highly efficient Hartzell constant-speed propeller.



HARTZELL
PROPELLER COMPANY
DEPT. A PIQUA, OHIO

Staff Engineer ARMAMENT

We have an attractive opening for a staff specialist in the design of aircraft armament systems, armor, and their installations. Duties include responsibility for evaluating various aircraft armament systems, the preparation of basic armament design specifications and the technical direction and administration of armament testing.

Applicants should have experience as an engineering specialist in a large design organization. Job requirements include engineering degree plus eight to ten years' experience in various aircraft armament fields, such as aircraft guns, ammunition chutes, ammunition feeders (including related pneumatics) and rockets (including pack design).

All inquiries will be held confidential. For further consideration submit letter of application to:

ENGINEERING PERSONNEL SECTION

CHANCE VOUGHT AIRCRAFT
INCORPORATED

P. O. Box 5907 — Dallas, Texas

ENGINEERS

Flight Refueling offers you a

LONG-RANGE FUTURE

YOUNG ENGINEERS with 2-4 years experience will find real opportunity for a long-range future with Flight Refueling Inc., designers and manufacturers of the Probe and Drogue equipment which gives unlimited range to jet aircraft.

Immediate openings for:

Test Engineers • Design Engineers
Assistant Project Engineers
Patent Engineer • Stress Engineers
Checkers • Materials Engineer
Draftsmen • Tool Designers

Send your resume giving details of education, experience and salary requirements to Personnel Director, Flight Refueling Inc., 930 East 22nd Street, Baltimore 3, Md. All queries held in strictest confidence.

FLIGHT REFUELING
INCORPORATED

Baltimore, Md.
Danbury, Conn.

Cessna ENGINEERING OPPORTUNITIES

with world's leading producer of light commercial airplanes

for

- **Design Engineers**
- **Design Draftsmen**
- **Research Engineers**

Send Resume to
Employment Manager
CESSNA AIRCRAFT CO.
WICHITA, KANSAS

ENGINEERS WANTED

For expanding activity in reinforced plastics airframes, in following classifications:

- **Stress Engineers**
- **Structural Designers**
- **Flutter & Vibration**
- **Thermodynamics**
- **Weights**

College degree—6 years' minimum Aircraft Experience

PERMANENT — SALARY OPEN

ZENITH PLASTICS
World's Largest Radome Builders
1548 W. 135th ST., GARDENA, CALIF.

ASSISTANT To DIRECTOR Of SALES

Well established aircraft hydraulic and pneumatic manufacturing company in Los Angeles has unusual opportunity for agressive Sales Engineer. Must be in current contact with major prime contractors in purchasing and engineering groups. To cover large portion of the United States. Submit complete sales and personal history with recent photograph, if possible.

P-1347, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

WANTED

Experienced

HELICOPTER TEST PILOT

To Fly

CONVERTIPLANE

Challenging Opportunity
With High Performance
Rotorcraft Program

Write Personnel Manager

JACOBS AIRCRAFT ENGINE COMPANY
POTTSTOWN, PA.

DESIGNERS, ENGINEERS...

The SKY'S no longer the LIMIT at Martin

Today the men at Martin are building the spaceborne systems of tomorrow. Every rocket that screams skyward brings back more information of outer space. Every day brings man closer to conquering the heavens. It's thrilling work — reaching beyond the sky.

And the sky is no longer the limit on OPPORTUNITY *at Martin. Young men are now in top positions at Martin. We need more young men for exciting jobs—creative engineers. We need:*

DESIGNER

•

STRUCTURAL PLASTICS ENGINEER

•

FLIGHT TEST INSTRUMENTATION ENGINEER

•

VIBRATIONS ENGINEER

•

STRUCTURES ENGINEER

•

AERODYNAMICS ENGINEER

•

JET POWER PLANT ENGINEER

•

Martin offers modern engineering facilities and liberal benefits, including company paid pension plan. Liberal travel and moving allowances. Housing readily available.

WRITE NOW TO: J. J. Holley, Professional Employment, Dept. AB-5. The Glenn L. Martin Co., Baltimore 3, Md. *Include confidential resume with full details of education and experience.*

Martin AIRCRAFT
THE GLENN L. MARTIN CO.
BALTIMORE • MARYLAND

AERODYNAMICISTS
STRESS ANALYSTS

We have several immediate openings for experienced Aerodynamicists who can assume responsibility for aerodynamic analysis, development, and improvement programs on our current fighter aircraft and guided missiles. Applicants should possess a degree in Aeronautical Engineering plus two to seven years of aircraft experience.

We also need aircraft Stress Analysts who will assume responsibility for the structural design integrity of either primary airframe components or secondary airframe components of military aircraft. Applicants should possess an Engineering degree plus two to seven years related stress analysis experience.

All inquiries will be kept strictly confidential.

Liberal company benefits include moving allowance for relocation.

Inquiries may be directed to:

ENGINEERING PERSONNEL SECTION

CHANCE VOUGHT AIRCRAFT
INCORPORATED

P. O. Box 5907 — Dallas, Texas

STRESS ANALYSTS

with actual aircraft stress experience

Also AIRCRAFT ENGINEERS AND DESIGNERS

Here's an opportunity to work in one of the most interesting and fastest-growing segments of the aviation field—

HELICOPTERS

Sikorsky Aircraft, foremost designer, developer, and manufacturer of helicopters, is increasing its production of the latest type, combat-proved helicopters and is expanding its research and development program.

Here's your chance to work with the top men in your profession—men who made the first practical helicopter.

You'll Find at Sikorsky Aircraft

—a company with large and important orders
—an engineering staff of exceptionally high calibre
—unduplicated research and testing facilities
—a respect for and interest in new ideas

You'll Enjoy These Advantages

—excellent salary
—cost-of-living adjustments
—good chance for advancement
—many insurance benefits, including a retirement income plan

Moving Expense Allowance

Send resume to E. H. TUTTLE

SIKORSKY AIRCRAFT

Division of United Aircraft Corporation

Bridgeport 1, Conn.

SPACE NOW AVAILABLE

NEW EXECUTIVE AIRCRAFT HANGARS

Catering to Executive Aircraft

- Long term leases
- Office and shop space
- Twin Beeches through DC 6's
- 24 hour service—all weather operations
- Maintenance—parts inventory
- All octane fuels
- Transient service
- Public taxis—helicopter service
- Adjacent airline terminal bldg.
- Air taxi—charter service
- Executive aircraft sales
- 40 minutes to Times Square

WRITE-WIRE PHONE **WESTAIR Inc.** WHITE PLAINS NEW YORK

Westchester County Airport

C-54 E SERIES AIRFRAME SECTION

OUTER WING PANELS CERTIFIED, Export packed. F.O.B. Los Angeles. Price per set..... $52,500.00

CENTER SECTION CERTIFIED, Export Packed. Price $125,000.00

FUSELAGE NOSE SECTION, STRUCTURE ONLY, Certified, Export Packed. Price..... $18,500.00

CERTIFIED EMPENNAGE or Parts Thereof.

Price on Request

AMERICAN AERONAUTICS CORP.

3104 West Vanowen Street Burbank, California

TWX BRB 7127 Tele. ROckwell 9-1296

RESTORE **POWER – PERFORMANCE – SAFETY**

REDUCE

DETONATION – WEAR – OPERATING COST

Blast clean engine combustion chambers regularly without disassembly. The new Kent-Moore Combustion Chamber Cleaner is now available for distribution to the aircraft industry. Inexpensively removes foreign deposits and instantly restores combustion efficiency. Requires only a few minutes per cylinder. Blast cleaning material is non-abrasive and non-corrosive. No harmful residues remain in engine.

—PROFITABLE DISTRIBUTORSHIPS AVAILABLE—

WRITE OR WIRE

RICE-PETERSON SALES, Inc.

P. O. BOX NO. 1114 • PALO ALTO, CALIFORNIA

AIRCRAFT EQUIPMENT REPRESENTATION

Needed in St. Louis-Kansas City Area. Prefer established manufacturer's agent specializing in—

AIRCRAFT, ENGINE and AIRLINE INDUSTRIES

Write details, including list of products presently handled to

RW-1375, Aviation Week
330 W. 42nd St., New York 36, N. Y.

CALIFORNIA SALES OUTLET

Manufacturers representative has facilities for one more account, requiring both sales and field engineering efforts.

RA-1388, Aviation Week
1111 Wilshire Blvd., Los Angeles 17, Calif.

OWNERS & BUYERS OF Executive and Airline Aircraft "Deal With Experience"

Our 30 years experience as one of the oldest and largest reputable buyers and sellers of transport aircraft should assist you in making your selection to delegate us to handle your aircraft purchase or disposal problems. Make us your clearing house for listings and inquiries.

FRANK AMBROSE
Box 181 Miami Int'l Airport, Miami 48, Fla.

DESIGNERS & PROJECT ENGINEERS

Established central Michigan manufacturer has openings for Designers and Project Engineers experienced in design and development of hydraulic and pneumatic servo mechanisms; also in electrical controls for these servos. Progressive company — opportunities for advancement. Pay commensurate with experience. Long range projects. Replies held in confidence.

NATIONAL WATER LIFT COMPANY
2220 PALMER AVENUE,
KALAMAZOO, MICHIGAN

OPENINGS IN HELICOPTER EXPRESS AND PASSENGER PROGRAM

Traffic, Materiel Control
Supply, Cargo, Accounting, Audit
Ground Operations

LOS ANGELES AIRWAYS, INC.
Box 10155 Airport Station Los Angeles 45, Calif.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITION VACANT

GOOD OPPORTUNITY for aviation writer-editor. Flying and promotional experience desirable. Write fully, giving complete background, references and desired salary. P-1338, Aviation Week.

POSITIONS WANTED

A. AND E. Mechanic — Desires position with Corporation — Experienced heavy Aircraft — 18 years in Aviation including Airline. All phases conversion and maintenance, age 36 — Married — One child — Willing to relocate. Would consider assignment. PW-1159, Aviation Week.

EXECUTIVE PILOT or combination position involving other duties in addition to flying. Bachelor's Degree. Administrative, Engineering, and diversified Sales and Promotional experience. Commercial S&MEL, SES, Instrument, Flight & Ground Instructor—all ratings. Licensed Flight Navigator and A & E. 2½ years International Airline Pilot, 3500:00 hours. Age 29. Resume on request. Box #542 Borough Hall, Kew Gardens 24, New York.

EXECUTIVE PILOT: 32, 8000 hrs. ATR SMEL C-46 DC-4. 8 yrs Airline Experience all points U. S. and Caribbean 2500 hrs. DC-3. Presently flying Captain for scheduled carrier. PW-1360, Aviation Week.

PRODUCTION ENGINEER; engines, aircraft, accessories. Directed processing, tool and gauge design, material handling, plant layout. 13 years experience—product engineering, automatic machinery, plant equipment. PW-1354, Aviation Week.

COMPLETE AERIAL Survey crew-pilot. Navigator — Magnetometer and Seintillometer operator. Seek position in this field. Crew over 75000 productive miles experience from coast to coast. Prepared to travel world wide (Have passports, etc.,) at short notice. Ex-RAF Bomber and trans-Atlantic crew on 17 types, including Dakota-Ventura-Canso Water inclusive. PW-1349, Aviation Week.

HELICOPTER PILOT with commercial certificates in both fixed wing & rotary type aircraft. Latest experience with Bell H-13. Over 200 hrs. Helicopter time. Single & free to travel. PW-1392, Aviation Week.

ENGINEERS

Attractive Positions

with

TEMCO

IN DALLAS, TEXAS

For Details See

JAN. 4 AVIATION WEEK

or Write

E. J. HORTON
Engineering Personnel
BOX 6191
DALLAS, TEXAS

FOR SALE

R-1340-AN-1 Pratt & Whitney **ENGINES** (Standard Cylinders). **ONE NEW.**

R-1340-AN-1 40-spline Pratt & Whitney **CRANKSHAFTS.**

12D40 Hamilton Standard **PROPELLERS AND HUBS.**

All certified ZERO TIME SOH by CAA approved shops.

North American AT-6, SNJ **AIRCRAFT** and components. **One SNJ-4 zero-time SOH.**

JOHN B. ROSENTHAL INC.
1025 Merner Road, San Mateo, Calif.
Telephone Diamond 4-0503
Cable address JONRO SANMATEO.

BUSINESS AIRCRAFT

We are specialists in the installation and servicing of

COLLINS
BENDIX
ARC

We have a complete stock for immediate installation

"Quality & Dependability for over seventeen years"

PAGE AIRWAYS, INC.
ROCHESTER AIRPORT, ROCHESTER, NEW YORK
Genesee 7301

FOR LEASE C-47. FOR SALE

Certificated For Scheduled Airline Operation

- CARGO VERSION
- FULL AIRLINE RADIO
- OXYGEN SYSTEM
- P&W 1830-92 ENGINES
- LARGE DOOR
- CARGO FLOOR
- MFG 1944
- JANITROL HEATER

"21 Years Experience in the Aviation Industry At Your Service"

LEEWARD AERONAUTICAL
P. O. Box 210, Fort Wayne, Ind. OR **International Airport, Miami, Fla.**

DEICER BOOT TIME

We Have Them In Stock

Factory Fresh—Not Surplus

DC-3 C-47 | **Beech D18S** | **Lodestar PV-1**

NAVCO, Inc. **Lambert Field** **St. Louis, Mo.**

EXECUTIVE AIRCRAFT

Delivery
Today

—In Our Own Name
—In Our Own Hangars
for your immediate inspection

SUPER-92 DC-3

Deluxe Executive
Just completed

New ship guarantee, complete 8000 hour overhaul, Super-92 engines, Collins radio, Beautiful custom interior, 200 miles per hour. Today's finest executive air transportation. Exterior paint color and design to your own preference.

MALLARD

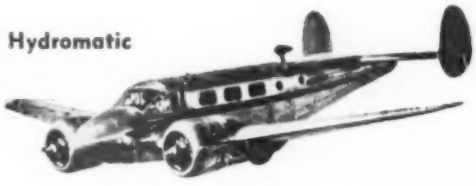
Complete Executive Interior Janitrol Heat, Ship-shore phone, etc. Complete Executive Radio Omni, VHF ILS ADF MHF LF. Traded on Super-92 DC-3

DOVE

Beautiful interior Full Bendix Radio VHF, OmniMag, RMI, etc. Autopilot, gyrosyn. Traded on Super-92 DC-3

D18S Hydromatic

NTSO, Relicense
VHF VOR ADF etc.
Bendix Autopilot
Traded on Super-92 DC-3



BONANZAS

$4995 and up
new and used

PV-1

Deluxe interior and equipment
Collins radio, Sperry gyrosyn, etc.

LODESTAR

Executive interior and equipment
Traded on Super-92 DC-3

DC-3

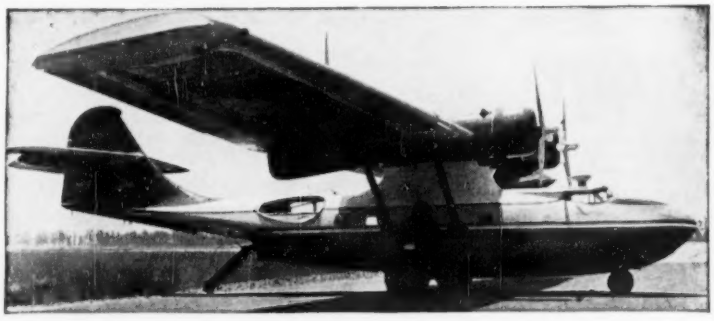
Special executive—$88,000
Good looking, safe, comfortable, economical

Other DC-3 to your specs—$88,000 up

First Deposits Take — Write, Wire, or Call — Today

Lambert Field **REMMERT-WERNER, Inc.** [illegible] Mo. CAbany 5425

PBY5A Specialists



Complete Overhaul & Maintenance of All Types of Aircraft

WE HAVE SEVERAL PBY5A AIRCRAFT FOR SALE
DISTRIBUTORS FOR BENDIX & LEAR RADIO
DEALER FOR COLLINS RADIO

Southern California Aircraft Corp.

Box 433 *Ph: Ontario 6-3871* Ontario, Calif.

FOR SALE
DC4-WING PANELS

IMMEDIATE DELIVERY

ONE - 5241819 - 1400 - LH
ONE - 5241819 - 1401 - RH
ONE - 5233003 - - LH

RECENTLY OVERHAULED AND RESEALED BY LOCKHEED AIRCRAFT SERVICE INTERNATIONAL

SEABOARD & WESTERN AIRLINES, INC.
HANGAR NO. 1—N. Y. INT'L AIRPORT
JAMAICA 20, N. Y.
OLYMPIA 6-5880 EXT.-19

FOR SALE
Two Hiller 360 HELICOPTERS
NO TIME SINCE OVERHAUL
$10,000.00 WORTH OF SPARES
Total Price: $55,000.00 F.O.B.
JOHN B. ROSENTHAL INC.
1025 Merner Road, San Mateo, California
Tel. Diamond 4-0503, Cable JONRO SANMATEO

FOR LEASE DC-3 FOR SALE

"Immediate Delivery"

• CHECK THIS EQUIPMENT!!

- Janitrol heater
- Full de-icing, anti-icing
- Airstair door
- Special large baggage door waist high
- Oxygen equipment
- Windshield de-frosters
- Hayes brakes
- Wing de-icer lights
- New modified hydraulic system
- Gasoline dump valves
- Fire warning system
- Electrical fuel boost
- Dual fuel system

RADIO EQUIPMENT

- A. D. F.
- M.N.53 marker 3 Lite.
- I. L. S.
- V. H. F. 70 channel (50 watt)
- Tower receiver (fixed)
- V. H. F. 4 channel (aux. rec.)
- L. F. receiver (range)
- Manual loop and azimuth
- H. F. RTA1-B trans. receiver
- Collins omni (optional)

All radio equipment type certificated.
Aircraft May Be Inspected At Our Fort Wayne Base or Miami, Fla.
Our 21 Years Experience In the Industry At Your Disposal.

LEEWARD AERONAUTICAL

P.O. Box 210, Fort Wayne, Ind. P.O. Box 233, International Airport, Miami, Fla.

BEECHCRAFTS
TWINS and BONANZAS

Guaranteed to be as represented

For the best, consult your
BEECHCRAFT DISTRIBUTOR

ATLANTIC AVIATION CORP.
TETERBORO AIRPORT LOGAN AIRPORT
TETERBORO, N. J. BOSTON, MASS.
Hasbrouck Heights 8-1740
East Boston 7-4630

SUPER-92

over 200 mph for your DC-3

CAA Approved R1830-SUPER-92 engines allow 700 HP normal cruise, better single engine—lower fuel and maintenance mileage costs with 20,000 extra miles between changes, with same overhaul intervals and costs as —92. Fully interchangeable with —92 —same weight, mounts, cowls, lines, etc. Proven by thousands of hours of practical executive operation.

ENGINE WORKS

LAMBERT FIELD INC. ST. LOUIS, MO.
PRATT & WHITNEY WRIGHT CONTINENTAL LYCOMING
SALE CAA OVERHAUL EXCHANGE

WE CAN DELIVER NOW!!!

SPERRY A-12 AUTOPILOTS

WITH
Automatic Approach Control

DC-3's - LODESTARS - B-23's

"The Fastest and Finest Installation in the Country"

Inquiries Invited — Call or Wire

PAGE AIRWAYS, INC.
ROCHESTER AIRPORT GENESEE 7301 ROCHESTER, NEW YORK

FOR SALE

Douglas—DC-3, DC-4, DC-6
Convair—240
Lockheed—Constellation
Beech—D-18S, C-18S
Lodestars—Executive Interior or For Conversion

Phone—Wire—Write

WESTAIR, INC.
WHITE PLAINS NEW YORK

WORLD'S LARGEST STOCK!

All parts listed—plus many more—are always carried in our huge stock of unused aircraft parts, accessories, AN and NAS hardware. Let us screen your inquiries.

AIRCRAFT ACCESSORIES

Description	Mfg.	Part No.	Quan.
Heater	Surface Combustion Co.	83A9	6
Heater	Stewart Warner (900,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	#15701-R	20
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	MF9-713-15H	120
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydraulic Pump	Vickers	PF4-713-20BCE	327
Hydraulic Pump/ 3000 P.S.I.	Vickers	MF45-3911-20Z	43
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO_2 Mfg. Co.	ASDC2	65
CO_2 Cylinders	Kidde	981280	185
CO_2 Cylinders	Kidde	M870036B	47
Anti-Icer Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Auxiliary Power Unit	Lawrence	LER-30D	16
Pump	Pesco	1EAR-2808H	15
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobble Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74
Windshield Wiper Kit	Marquette	K14949E	140

ENGINE ACCESSORIES

Starter	Eclipse	1416-12E	75
Generator	Eclipse (NEA-3A)	716-3A	100
Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
Carburetor	Stromberg	PR48-A1	236
Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SF9-LN-2	407
Fuel Pump	Pesco	2P248EB	6
Fuel Strainer	U.A.P.	U635A	76
Governor	Woodward	5x18	10
Prop. Reversing Control	Ham. Standard	72400	20
Oil Separator	Eclipse	564-2A	384
Oil Filter	Purolator	2731-L	100
Pressure Relief Valve	Aerotec	V301B7	20
Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
Engine	Wright	R-1820-54	16
Engine	Wright	R-1820-60	4
Engine	P & W	R-1830-43	1
Bearing	P & W	1045A	166
Flange	P & W	3506	500
Follower Assy.	P & W	8288	130
Blower Assy.	P & W	3M814	814
Shaft	P & W	48362	53
Shaft	P & W	48363	75
Gear	P & W	48461	390
Gear	P & W	76236	78
Bearing	P & W	84289	1178
Housing	P & W	84487	113
Nose Housing	P & W	84591C	77
Crankcase Assy.	P & W	84350-D	200
Pump Assy.	Wright Aero	420313	33
Drive Assy.	Wright Aero	416421	46
O.E.C. Unit		FM1	36

AIRCRAFT ENGINES & PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
O.E.C. Unit		PY4M(B24)	17
Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ29AAY	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp. Indicator	Weston	828TY13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Manifold Pressure Gauge	U.S. Gauge (Metric)	AW2-3/4-25K	146
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	828TY12Z2	40
Carb. Air Temp.	Lewis	77C3	22
Carb. Air Temp.	Weston	119862	40
Air Temp. Gauge	Weston	727TY70Z2	11
Air Temp. Gauge	Weston	727TY72Z2	85
Air Temp. Gauge	Weston	727TY73Z2	88
Air Temp. Gauge	Weston	727TY74Z2	83
Air Temp. Gauge	Weston	728-40Z2	10
Air Temp. Gauge	Weston	727-TY37P	298
Air Temp. Gauge	Lewis	47B22	33
Air Temp. Gauge	Lewis	47B23	28
Air Temp. Gauge	Lewis	47B24	54
Air Temp. Gauge	Lewis	47B21	30
Cylinder Head Temp.	Lewis	76B19	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachometer Indicator	Eclipse	2222-1F-2A	200
Magnesyn Pos. Indicator	Eclipse	20000-8A-14	9
Magnesyn Transmitter	Eclipse	20000-43A-13A1	8
Magnesyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	254BK-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
Receiver	Bendix Radio	RA10-DB	35
Amplifier (PB10) W/ED8 Mount	Eclipse	15401-1	10
Amplifier	Eclipse	12086-1C	11
Radio Noise Filter	G.E.	1C-200	740
Radio Noise Filter	G.E.	NF10084	959
Tube		JAN6AL5	327
Standing Wave Ind.	Hewlett Packard	415A	3
Antenna Switch	Bendix Radio	MS49A	26
Control	Bendix Radio	3616	81
Station Box	Bendix Radio	3620	23
Insulator	Bendix Radio	MT48C	518

ELECTRICAL PARTS

Transformer	Eclipse	DW33	11
Transformer	Eclipse	DW28	80
Transformer	Eclipse	DW47	33
Transformer	G.E.	70G3	26
Servo Motor	Transicoil	#1300-20	57
Motor	G.E.	5BA40NJ1A	425
Motor	G.E.	5DP65-MB1	189
Motor	G.E.	5BA25D-J4B	44
Motor	Airesearch	26675	25
Motor	Diehl	FD65-5	21
Circuit Breaker	Spencer	PM-5	2094

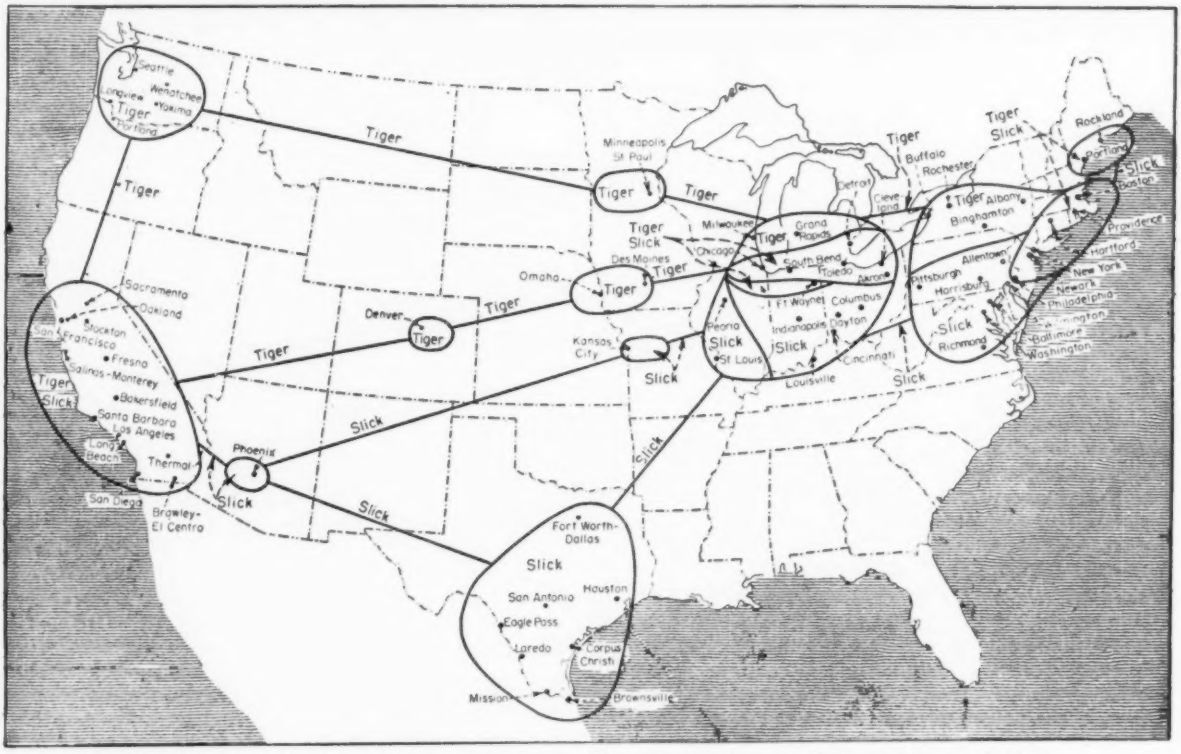
ELECTRICAL PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
Circuit Breaker	Spencer	C6363-1-5A	115
Circuit Breaker	Spencer	C6363-1-2A	115
Circuit Breaker	Heinemann	AM1614-80	1700
Circuit Breaker	Cutler Hammer	6141-H69A	237
Amplidyne	G.E.	5AM31JJ9A	31
Amplidyne	G.E.	5AM31NJ10	111
Switch	Kidde	A-4614	151
Ignition Switch	Scintilla	AN3213-1	70
Ignition Switch	Nesco	A-9(94-3226)	250
Master Switch	Jos Pollack	M862A	66
Thermo Switch	Fenwall	17322-2	126
Heater Control Switch	White-Rodgers	1033-4E1	287
Air Ram Switch	Minn. Honeywell	PG208AS1	148
Air Ram Switch	Minn. Honeywell	PG208AS7	40
Pressure Switch	Aerotec	M-101-B	20
Pressure Switch	Eclipse	3135-11C	88
Impact Switch	Kidde	SA/3A	18
Switch	C.H.	8909-K99	2000
Dome Light	Grimes	AN3096-4	2585
Dome Light	Grimes	AN3096-5	775
Dome Light	Grimes	AN3096-6	1365
Plug	Cannon	NAF310310-4B	2747
Plug	Cannon	NAF310310-5B	402
Relay	Leach	7264-404	47
Relay	Leach	7210	24
Relay	Allied	BOBX-2	31
Relay	Square D	82A	718
Relay	G.E.	CR2791-G100-K4	281
Relay	G.E.	CR2792F101-A3	626
Relay	Guardian	G344654	41
Relay	Guardian	G31502-A	350
Relay	C. P. Clare	D2060	45
Control Box	Vapor Car Heating Co.	9804B	34
Compensator	Vapor Car Heating Co.	46B311	25
Solenoid	Interstate Aircraft & Eng. Co.	A812	202
Flex. Cable	Airesearch	25432	66
Temp. Control	Fulton Syphon	715E	52
Noise Filter	Mallory	NF3-5	500
Regulator	G.E.	3GBD1A18A	13

VALVES

Valve	Kidde	982585	326
Valve	Oh. Chem.	AN60009-1B	325
Valve	Oh. Chem.	AN60009-2A	247
Valve (3000 PSI)	Parker	2-1046-76	47
Restrictor Valve	Parker	SP4-2746-77	68
Restrictor Valve	Parker	SP4-2746-78	105
Restrictor Valve	Parker	SP4-2746-79	40
Restrictor Valve	Parker	SP4-2746-80	48
Restrictor Valve	Parker	SP4-2746-81	60
Restrictor Valve	Parker	SP4-2746-76	142
Restrictor Valve	Adel	18784	33
Cone Check Valve	Parker	PL2-2546-75	127
Cone Check Valve	Parker	PL2-2546-76	123
Cone Check Valve	Parker	PL2-2546-77	620
Cone Check Valve	Parker	PL2-2546-78	540
Check Valve	Parker	PLY-843-54	112
Check Valve	Parker	PL2-1846-77	23
Check Valve	Kenyon	19100-2-101B	67
Check Valve	Eclipse	557-5	9
Check Valve	U. S. Gauge	AW-CV-1-1	180
Valve	Parker	6-746-10	68
Valve	Vickers	AA31400	28
Restrictor Valve	Adel	18784	33
Lock Valve	Adel	12924-2	85
Brake Valve	Vickers	146102	22
Selector Valve	Parker	SP-1-445-8	7
Selector Valve	Adel	D9530	478
Selector Valve	Adel	D9530-2	668
Selector Valve	Adel	D9560-2	428
Selector Valve	Adel	D9632	179
Selector Valve	Adel	D9696	237
Selector Valve	Adel	D10044	744
Selector Valve	Adel	D10051	244
Solenoid Valve	United	37D6210 (AN4078-1)	2200
Magnetic Valve	General Control	AV1B1174	114
Throttling Valve		73-A-01	1865
Relief Valve	Airex	1265-900	240
Pressure Relief Valve	Aerotec	V301B7	20
Valve	Aero Supply	74247 (TyPH3)	814
Valve	Whittaker	AN5830-1	335
Valve	Whittaker	AN5830-6	74
Valve	Parker	AN5831-1	60
Valve	Eclipse	612-4A	180
Valve	Kohler	K1593-6D	1888
Valve (0-500PSI)	Bendix	146102	46

COMMERCIAL SURPLUS SALES CO.



AREAS NOW SERVED by Flying Tiger Line and Slick Airways. Routes are due for recertification in August of this year.

Pilot Dispute May Slow Slick-Tiger Union

- **Seniority is major obstacle as two big airfreighters map consolidation plans following CAB approval.**
- **Flying Tiger Line to emerge as surviving corporation, with FTL president Robert Prescott as chief officer.**

Disagreement between pilots of the two air carriers last week threatened to delay the merger of the Flying Tiger Line and Slick Airways, approved by Civil Aeronautics Board on Jan. 7.

The pilot dispute over seniority was the major obstacle faced by the two cargo lines as top management met to discuss moves necessary to carry out the terms of the Board ruling.

CAB, in approving the merger, said it is "consistent with the public interest and will not result in a monopoly or restrain competition or jeopardize other air carriers."

Although several of the major passenger lines opposed the merger on the grounds that it would provide undue competition in the airfreight market, the Board's decision was unanimous.

It was the first transcontinental merger proposal to come before the Board, which was created in 1938 after present transcontinental passenger lines were established.

▶ **Surviving Line**—Financing of the merger provides for emergence of Flying Tiger as the surviving corporation.

Robert W. Prescott, president of the Tigers, and Thomas L. Grace, chief of Slick, estimate this will require issuance of approximately 225,000 additional shares of common stock and 450,000 shares of a new Series B 5½% convertible preferred with a $10 par value.

Prescott is to be named president of the combined firm, with Grace as executive vice president. The proposed board of directors will consist of nine from FTL and six from Slick.

▶ **Stock Transfer**—Each Slick stockholder will receive one-half share of Tiger common plus one full share of a new issue preferred (Series B) with par value of $10. Recent price of Tiger was about $7 a share.

If the new preferred sold at $8, that plus the half-share common would make about $11.50. Slick's original common stock issue had par value of $1, and its book and market values have been near that figure.

During the hearings, counsel for CAB's Bureau of Air Operations maintained that the merger terms were unfair to Tiger stockholders. He said present Slick holders would contribute $4,409,158 and FTL holders $8,266,952 in book value to the merged company.

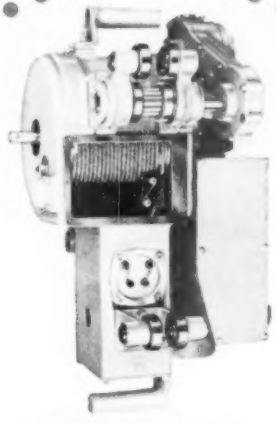
He noted Slick holders will get $5,492,310 in securities for $1,083,152 that the Tiger holders lose. Thus the interest of the Slick group will increase from 44% to 56% and the Tiger group interest decrease from 56% to 44%, he reported.

However, CAB examiner F. Merritt Ruklen notes that the Slick and FTL holders approved the terms and that the "Tiger group evidently believes that the saving . . . which will result from their management of the combined company, will either increase the earn-

QUICK PICKUP!

with an Aircraft Hoist

by BREEZE MARK



CARGO HANDLING • TOWING
ENGINE CHANGING • RAMP OPERATING
RESCUE WORK • OTHER USES

■ Whether you want to pick up a 160-lb. man or 10,000 lbs. of cargo, BREEZE can engineer the right strato-hoist for your needs.

We have developed a new line of cargo handling hoists and winches that offer the advantages of compactness and precision performance.

All feature a high rated load in relation to extremely light weight. All have special overload and safety features to meet the exacting standards of the advancing aircraft industry. For the newest in electrical, mechanical or hydraulic hoists, consult BREEZE engineers.

OUR SPECIALISTS ARE AT YOUR SERVICE.

BREEZE

CORPORATIONS, INC.
41 South Sixth Street • Newark 7, N. J.

Radio Ignition Shielding | Flexible Metal Tubing | Actuating Systems | Welded Diaphragm Bellows | Aero-Seal Hose Clamps

World's largest—Ryan fuel tanks for B-47 Stratojet

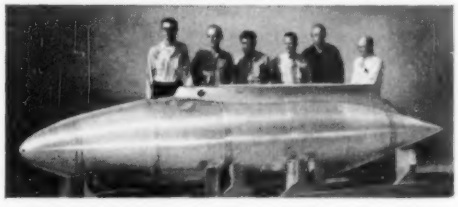
THE PROBLEM: The world's fastest bomber, the far-ranging B-47 Stratojet, needed the world's largest wing fuel tanks . . . tanks with a capacity equal to that of a good-sized tank truck. What's more, these tanks had to be completely gas-tight by welding alone. THE SOLUTION: Boeing turned to Ryan who devised ingenious methods to manufacture in volume the huge, external tanks – each of which requires more than 30,000 electrical spot welds.

Besides developing and manufacturing products of its own design, Ryan produces airframe components to prime contractors' specifications. Typical of these are other "range extending" products, like the Ryan-built aft fuselages and refueling pods for Boeing's KC-97 mid-air refueling plane.

These accomplishments point up Ryan engineering skill . . . skill that has been *specialized*, *ingenious* and *versatile* for 31 of the 50 years since powered flight began. Master craftsmen, Ryan does the *difficult*, the *intricate*, the *precision* jobs of today's high-speed air age.

RYAN AERONAUTICAL COMPANY

Factory and Home Offices: Lindbergh Field, San Diego 12, California
Other Offices: Washington, D.C.; Dayton, Ohio; Seattle, Washington; New York City



Ryan builds Boeing KC-97 fuel tanks, too.

RYAN

★ SPECIALIZED
★ INGENIOUS
★ VERSATILE

Advanced-type Aircraft and Components
Jet and Rocket Engines and Components
Exhaust Systems for Aircraft
Electronics Equipment
Ceramics for "Hot Parts"
Weapons Systems Design and Management
Aircraft and Power Plant Research
Metallurgical Engineering
Thin-Wall Ducting
Firebee Pilotless Jet Planes

Pioneers in Each ÷ Leaders in All

Flying Tiger-Slick Finances

	Flying Tiger Line	Slick Airways
Profit and loss 12 months ending Sept. 30, 1953:		
Revenues	$7,857,000	$9,619,000
Operating profit	$1,225,000	(−$290,000)
Net profit	**$1,698,000**	**$205,000**
Profit and loss November 1953:		
Revenues	$626,000	$917,000
Operating profit	(−$33,000)	(−$32,000)
Net profit (loss)	**(−$3,000)**	**(−$94,000)**
Position Nov. 30, 1953:		
Current assets	$5,791,000	$4,172,000
Current liabilities	$3,995,000	$3,655,000
Long-term debt	$5,180,000	$476,000
Stock equity	$3,210,000	$4,303,000

SOURCE: Civil Aeronautics Board reports from carriers.

ing power of the combined company 21% or will provide other benefits justifying the price paid. . . .

"This belief does not appear unreasonable. . . . Furthermore, under Delaware law any Tiger stockholder dissatisfied with the merger could require the company to pay him for the value of his stock by complying with certain simple procedures."

▶**Slick Disappears?**—There was some question whether Slick would disappear as a result of the merger.

A top Slick official says the new line will be known as Flying Tiger-Slick Airlines. But a spokesman for the Tigers says Slick planes will be repainted with the Tiger name as they come in for overhaul.

"We may continue the combination as long as we feel it prudent businesswise," he says, "but I expect the Slick name soon will disappear."

▶**$24-Million Assets**—Combined assets of the two firms are expected to total some $24 million. The combine will operate the world's largest airfreight fleet, with four DC-6As, 11 DC-4s and 45 C-46s serving a joint system of nearly 100 U. S. cities.

Latest figures indicate annual operating income of the Tigers is more than $25 million, Slick about $11 million.

Company officials estimate that the resulting company may be the nation's fifth largest domestic airline on the basis of traffic volume.

The companies predict that combined annual traffic volume will exceed 100 million ton-miles of airfreight, excluding military contract and charter traffic. This would be about 48% of the nation's total airfreight volume. Total ton-mile traffic in both scheduled and nonscheduled service is expected to exceed 232 million, while miles flown is estimated at 31 million.

The firms estimate their annual business volume will top $45 million, with a substantial profit increase due to economies resulting from the merger.

Duplicate maintenance and operational facilities at many cities will be eliminated. Management now is discussing this consolidation of offices at joint terminals.

At Chicago, for example, where the two lines operate from different airports, officials must decide whether to move the Tigers to the Slick office or vice versa.

▶**Labor Cutback**—Both carriers recently cut back their labor forces to a bare minimum in anticipation of CAB approval of the merger. "Most of the labor readjustment has been accomplished already," a spokesman says.

Actual transfer of the Slick certificate to FTL will not take place until the surviving firm shows it is ready to fulfill all conditions laid down by the Board, including its protective labor ruling.

How long it will take to settle the pilot dispute is not known. If Slick pilots take their case to court, as they have threatened, it could delay the merger during months of court proceedings.

Barring the pilot controversy, officials of the two lines say they could make the necessary showing before the Board within a few weeks.

▶**Proposed Solution**—On the labor question, CAB rules:

"Questions arising from the proposed merger respecting the seniority rights of employes of Tiger and Slick should be treated in the same manner as in the Braniff-Mid-Continent and Delta-Chicago & Southern merger cases, namely by negotiations to integrate the respective seniority lists and if negotiations fail, by arbitration."

Although the Air Line Pilots Assn., representing Tiger pilots, has expressed itself in favor of the Board's stand, Slick pilots, members of a company union, have opposed the idea of arbitration.

CAB says:

"We find no reason to depart from our view that seniority disputes arising from airline mergers are best settled by negotiated agreement and that the other methods—arbitration, integration by Board action, and leaving the dispute to be resolved by economic pressure—descend in desirability in the order stated."

The dispute boils down to the question of how seniority is to be computed. "There is no agreement in sight," says one company pilot.

Temporary certificates of both lines expire in August. "Our present decision," says CAB, "will in no way prevent us from renewing, modifying or not renewing these certificates when they come before us."

CAB ORDERS

(Jan. 3-10)

GRANTED:

Northern Consolidated Airlines exemption to serve Eek, Alaska, on flights between Bethel and Kwigillingok.

APPROVED:

International Air Transport Assn. members' amendments to their "provisions for the regulation and conduct of traffic conferences of IATA." U.S. carriers must notify CAB of any fine or penalty assessed against them under IATA rules and authorize and direct the director general to furnish such records to the Board.

DISMISSED:

United Air Lines request for exemption to fly all-cargo services through Detroit from Denver and New York. Company withdrew its application.

SUSPENDED:

Aviation Corporation of Seattle cutrate passenger fares proposed between Anchorage and Fairbanks on cargo planes. CAB will investigate the proposal.

Moore to Join ACC

F. Lee Moore, Jr., has resigned as Transport Editor of AVIATION WEEK effective Jan. 24 to become executive secretary of the Air Coordinating Committee. He will succeed Charles O. Cary, who is leaving the President's air policy group to join Curtiss-Wright Corp.

A former Navy pilot, Moore has been a member of AVIATION WEEK's Washington staff since he joined the publication in September 1950 after working on the staff of Engineering News-Record, another McGraw-Hill magazine. He had done work for McGraw-Hill Economics Department and formerly was associated with the Trust Investment Division of Guaranty Trust Co. of New York.

Five of Cary's nearly 10 years in government service were spent as ACC's executive secretary.

Examiner Urges S&WA Certificate

Carrier recommended for trans-Atlantic routes on basis it has emphasized developing European cargo market.

Airfreight competitors between U.S. and Europe may increase to 12 before year's end.

Civil Aeronautics Board examiner Herbert Bryan has recommended Seaboard & Western Airlines for a certificate and says a British independent, Airwork, Ltd., also may get a U.S. foreign air carrier permit soon.

Seaboard has flown U. S.-Europe commercial common carriage freight since 1946, as well as contract passengers and freight services across both Pacific and Atlantic.

▶**Seaboard Selection**—The examiner decided that a U. S.-flag airfreight line is needed but that more than one such competitor would weaken chances of success for all. He picked S&WA from among the six applicants largely on grounds that "Seaboard appears to be the most able of all the applicants to develop the trans-Atlantic air cargo potential."

Examiner Bryan had cut the applicants to three: Seaboard, Flying Tiger Line and Transocean Air Lines. He noted these lines "will have adequate equipment in the foreseeable future to inaugurate operations" because "operation of postwar equipment would be necessary to be economically sound."

Bryan makes these comparisons:

• **Flying Tiger** "unquestionably has had the greatest experience as an all-cargo operator." However, he adds, all its commercial experience is in domestic markets, and its management will be preoccupied with the Slick Airways integration (see p. 80) and continued exploitation of domestic markets.

• "**Transocean,** like the Tigers, is involved in enterprises (largely in the Pacific) far removed from the trans-Atlantic air cargo field." Also, the examiner reasons, Transocean's far-flung network of air and ground business operations is "so varied and extensive that it must be concluded that they require considerable attention of management."

• "**Seaboard,** which consistently has put major emphasis on development of its trans-Atlantic commercial airfreight market, therefore is most deserving of U. S. designation as its U. S.-Europe airfreight specialist."

The examiner proposes that S&WA be certificated for five years, cargo only, between the U.S. (New York, Philadelphia and Baltimore) and Europe (England, Netherlands, Belgium, Germany, France and Switzerland), via Newfoundland and Ireland.

▶**Reversed Decision**—An earlier CAB decision, approved by former President Truman, denied need for and practicality of any proposed U.S. trans-Atlantic airfreight specialist.

Examiner Bryan says this decision largely was based on evidence up to October 1949 and on grounds that "the proposed services could not be financially successful . . . and evidence of national defense requirements of record was insufficient to counter-balance the adverse effect of the proposed services to require certification."

Now, he says, new revenue and expense forecasts—based on lower rates and more modern equipment—will increase the market potential and the chances of financial success, operating DC-6 or Super Constellation-type equipment.

"Finally, the Department of Defense, which was not a party to the original proceeding, presented evidence with reference to national defense requirements which was not formerly of record," he adds.

Line Loses Name

Los Angeles—North American Aircoach System is denied use of the name "North American" in a ruling by U. S. District Judge Pierson M. Hall.

The decision was handed down in a suit brought by North American Aviation, which charged the nonscheduled aircoach group was trading on NAA's long-established name.

President Jack B. Lewin declares North American Aircoach System will appeal the decision.

"I believe," he says, "that before this trial it had been agreed that should a negative decision be received the injunction would not apply until we had a chance to take it to the Court of Appeals."

James Fischgrund, vice president of the aircoach combine, says nearly $2 million has been spent to advertise its name of North American. He estimates that loss of the name would cost the nonscheduled carrier from $3 million to $5 million in business.

In another proceeding in which American Airlines complained about use of "North American Airlines," Civil Aeronautics Board Nov. 4 ordered the irregular carrier to cease using the name.

▶**Cargo Carrier Needed**—Here are examiner Bryan's main reasons for recommending CAB and Presidential certification of an American airfreight line to compete with U.S. combination carriers, Pan American World Airways and Trans World Airlines, plus foreign-flag lines, Air France, British Overseas Airways Corp., El Al Israel, KLM Royal Dutch Airlines, LAI Italian, Sabena, Scandinavian Airlines System and Swissair:

• **Concentrated competition.** In 1952, the top three carriers, PAA, KLM and TWA, carried 65% of the cargo business, and the top six handled 92% of it.

• **Growing market.** Pan American estimates that with its proposed rate cuts, the volume will increase 60% over the levels which had existed at former rates.

"Therefore, there would be a volume of potential airfreight varying between 35 and 40 million lb. per year remaining to be developed," Bryan says.

• **Costs.** The examiner estimates the monthly profit and loss of the applicants' proposed services as follows: European-American Airways (loss of $25,584; Tigers, $113,100 profit; Overseas National, loss of $46,945; Seaboard, $67,649 profit; Trans Caribbean, loss of $65,648, and Transocean, $42,483 profit.

• **Defense Department** "expresses a need for more all-cargo type aircraft." The "competitive spur" of an all-cargo service" would ensure continued operation of all-cargo aircraft in the future," Bryan comments.

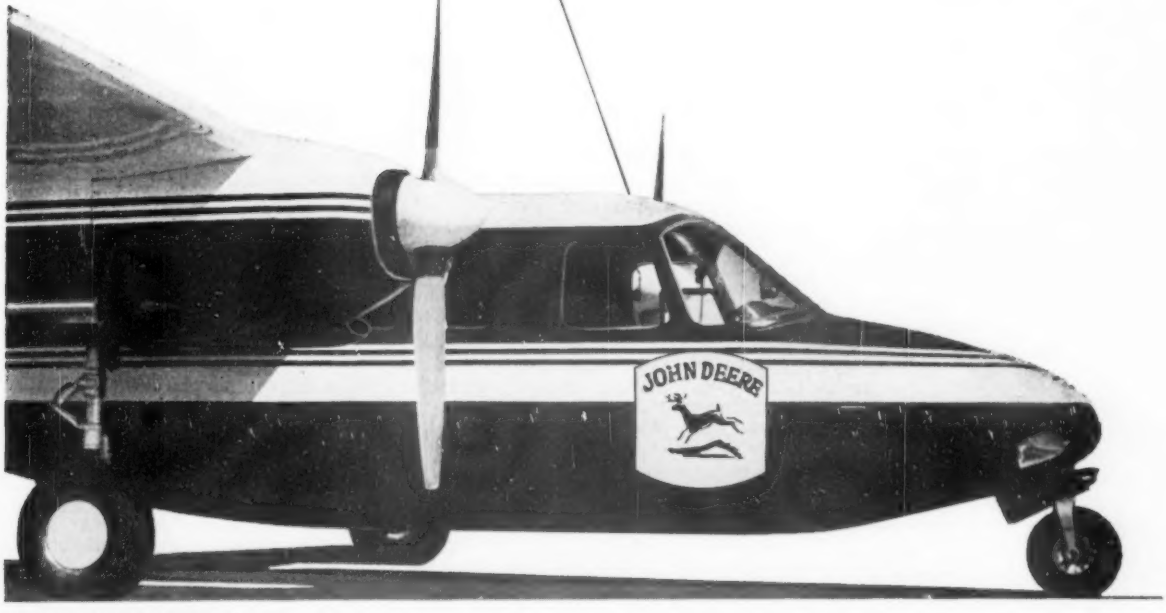
• **Diversion.** During 1952, PAA hauled $5.4 million of Atlantic airfreight and TWA $3.5 million. If there were no traffic increase, diversion of it to the new applicant theoretically would be 3.5% of the total volume based on scheduled capacity relationship, or "one-quarter million dollars to Pan American and less than that to TWA."

Expansion of the market from natural growth and competitive spur would make diversion less than that, the examiner concludes.

• **British competitor.** Finally, the examiner notes that there is a likelihood of U.S. grant of a trans-Atlantic airfreight permit to Airwork under the terms of the U. S.-British bilateral agreement.

He concludes: "In the event Airwork were granted a foreign air carrier permit and the applications herein were denied in their entirety, the Board would have to assume the anomalous position of finding that public interest factors require a permit for a foreign air carrier while finding that similar conditions do not require a certificate for a domestic air carrier to provide a like service."

a nose for business



DEERE & COMPANY . . .

This pioneer American Farm Implement manufacturer is now operating two Aero COMMANDERS to provide safe, fast, economical and reliable transportation for its executives.

Complete information on request.

AERO DESIGN Commander

AERO DESIGN AND ENGINEERING COMPANY
TULAKES AIRPORT P. O. BOX 118 • BETHANY, OKLA.

TRANSMISSION LINE TOWERS DESTROYED by tornado in Worcester County, Mass., June 9, 1953, indicate peripheral winds approached 340 mph. In this artist's conception of damage to power lines, lying just to the east of Worcester, note that tower pair No. 3 was not blown down since it lay near the eye of the storm. Tree damage in this area, like building damage in the city, indicates the 40-mi.-long path of the tornado was about a half-mile wide at this point.

Tornadic Wind Hits 335 Mph.

New evidence indicating the velocity of winds in a tornado is reported by a public utilities engineer, who estimates that speeds of at least 335 mph. must have been attained in a storm that hit Worcester, Mass., June 3, 1953.

Speculation on tornado wind speeds has been a lively topic in aviation for years. Most anemometers which have been in the path of these storms have been destroyed or were not built to register such high velocities.

Clyde A. Booker, transmission line engineer for New England Power Service Co., Boston, Mass., bases his report —published in Engineering News-Record, a McGraw-Hill publication—on damage to six transmission line towers in the tornado's path. The estimates are believed close because the design of the towers had been tested to destruction at their installation in 1928.

The tornado advanced at a rate close to 35 mph. and devastated a 40-mi. strip ranging in width from 100 yd. to a half-mile. Twenty minutes after the main storm had passed, a second less intense storm developed on a roughly parallel route about 10 mi. to the south.

Three pairs of towers, in a line of four, were blown down on a transmission line running north and south on the east side of Worcester.

Tree damage adjacent to the transmission line right-of-way indicates that the tornado path was ½-mile wide at that point and that it struck almost at right angles to the transmission lines.

Tower pairs Nos. 1, 2, and 4 (starting from the south side of the tornado path) were knocked down while No. 3 pair remained standing. Rough measurements indicate that the center, or eye, of the storm passed just to the south of No. 3. The twister winds on the south side of the tornado path blew tower pairs 1 and 2 over to the east, and the winds on the north side blew No. 4 pair over to the west.

When the tower design was tested in 1928, the test tower failed under a transverse load equivalent to 14,050 lb. applied at the crossarm after making suitable allowance for the vertical loads present during tornadoes. By taking the adjusted, projected area at crossarm height of tower, ground wires and conductors, the pressure necessary to destroy tower No. 4 converts to 148-mph. wind velocity at that point. A similar computation at tower No. 1 gives an average velocity of 170 mph. These velocities are the minimum average necessary to cause failure, since inspection after failure showed the footings and all other features of the towers to have been in perfect condition before the violence of the storm struck in that vicinity.

Since tower No. 3—near the eye of the storm—did not fail, and since the tree damage at the edge of the tornado path indicated a velocity not over 50 mph. (the storm advanced at 35 mph.), the author assumes that there was no peripheral velocity at the eye of the storm and at the edge.

A profile of the minimum peripheral ground velocities which was taken through the eye of the storm and normal to its direction of advance shows that there must have been a peak velocity of from 260 to 270 mph. on the north side of the tonado, and a velocity ranging from 330 to 340 mph. on the south side.

These values of velocity agree closely with the established rate of advance of the storm which was just about 35 mph. Checks on tension braces and strain on the conductors indicate that winds could not have exceeded 375 mph., Mr. Booker said.

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—JANUARY 18, 1954

A. C. SPARK PLUG DIV., G. M. C. 67
Agency—D. P. Brother & Co., Inc.
ACME ELECTRIC CORP. 54
Agency—Scheel Advertising Agency, Inc.
AERO DESIGN & ENGINEERING CO. 85
Agency—Tom P. Gordon Co.
AEROQUIP CORPORATION 64
Agency—Hogeraft-Keller, Inc.
AEROTEC CORPORATION, THE 24
Agency—Hening & Co., Inc.
AIR ASSOCIATES, INC. 25
Agency—DeGarmo, Inc.
AIRBORNE ACCESSORIES CORP. 4
Agency—Gray & Rogers Adv.
AMERICAN STANDARD PRODUCTS, INC. 59
Agency—Edward Graceman & Assoc.

BREEZE CORPORATIONS, INC. 81
Agency—Burke Dowling Adams, Inc.

CHANCE VOUGHT DIV., UNITED AIRCRAFT CORP. 11
Agency—Lennen & Newell, Inc.
CLIFFORD MFG. CO. 49
Agency—James Thomas Chirurg Co.
COLLINS RADIO CO. 37
Agency—W. D. Lyon Co., Inc.
CONSOLIDATED INDUSTRIES, INC. 87
Agency—Hugh H. Graham & Assoc., Inc.
CONSOLIDATED VULTEE AIRCRAFT CORP. ..... Front Cover
Agency—Buchanan & Co., Inc.
CURTISS WRIGHT CORP. 68
Agency—Burke Dowling Adams, Inc.

DOW CORNING CORP. 50
Agency—Don Wagnitz Adv.

EDISON, INC., THOMAS A. 40
Agency—Gotham Adv. Co., Inc.
EDO CORPORATION 66
Agency—Davis-Parsons, Inc.
ELASTIC STOP NUT CORP. ..... Fourth Cover
Agency—G. M. Basford Co.

FLEXONICS CORPORATION 6
Agency—Russell T. Gray, Inc.
FLIGHT REFUELING, INC. 86
Agency—Davis-Parsons, Inc.

GOODYEAR AIRCRAFT CORP. 21
Agency—Kudner Agency, Inc.

HARTZELL PROPELLER CO. 73
Agency—Kight Advertising, Inc.
HOLLEY CARBURETOR CO. ..... Second Cover
Agency—Holden-Clifford-Flint, Inc.

JAMES-POND-CLARK 54
Agency—Western Adv. Agency, Inc.

KIDDE & CO., INC., WALTER 3
Agency—Cunningham & Walsh, Inc.
KOCH AND SONS, H. 27
Agency—The J. J. Weiner Co.
KOLLSMAN INSTRUMENT CORP. 62
Agency—Erwin, Wasey & Co., Inc.

LEWIS ENGINEERING CO. 70

MANNING, MAXWELL & MOORE, INC. 72
Agency—Fuller & Smith & Ross, Inc.
MAURER, INC., J. A. 22
Agency—Gaynor & Company
M B MFG. CO., INC., THE 52
Agency—Rickard & Co., Inc.
MISCO PRECISION CASTING CO. 65
Agency—L. Charles Fussler, Inc.
MONOGRAM MFG. CO. 8
Agency—Taggart & Young Adv.

NORTHROP AIRCRAFT, INC. 53
Agency—West-Marquis, Inc.
NORTH AMERICAN AVIATION, INC. 89
Agency—Batten, Barton, Durstine & Osborn, Inc.
NUTT SHEL COMPANY 26
Agency—Welsh-Hollander Adv.

PARKER AIRCRAFT CO. 46, 47
Agency—Fuller & Smith & Ross, Inc.
PASTUSHIN AVIATION CORP. 33
Agency—Lynn-Western, Inc.
PHILLIPS PETROLEUM CO. 5
Agency—Lambert & Feasley, Inc.
PIONEER PARACHUTE CO. 63
Agency—Julian Gross Advertising Agency

RAYMOND ROSEN ENGINEERING PRODUCTS 69
Agency—Al Paul Lefton Co., Inc.
RED BANK DIV., BENDIX AVIATION CORP. 36
Agency—MacManus, John & Adams, Inc.
RELIANT INDUSTRIES 69
RHEEM MFG. CO. 12
Agency—Campbell-Ewald Co.
ROBINSON CO., RALPH C. 54
Agency—Chapin-Damm Advertising
RYAN AERONAUTICAL CORP. 82
Agency—Batten, Barton, Durstine & Osborn, Inc.

SEARCHLIGHT SECTION 74, 75, 76, 77, 78, 79
SERVOMECHANISMS, INC. 41
Agency—Sanger-Funnell, Inc.
SPERRY GYROSCOPE CO. ..... Third Cover
Agency—Beach, Yates & Mattoon, Inc.
SPERRY GYROSCOPE CO. 89
Agency—Equity Advertising Co.
STAR STAINLESS SCREW CO. 89
Agency—Harold Marshall Adv. Co.
STRATOS DIVISION FAIRCHILD ENGINE & AIRPLANE CORP. 35
Agency—Gaynor & Company
SUMMERS GYROSCOPE CO. 60
Agency—Byron H. Brown & Staff
SUPERIOR TUBE CO. 39
Agency—John Falkner Arndt & Co., Inc.

TWIGG INDUSTRIES, INC. 71
Agency—LaGrange & Garrison, Inc.

U. S. STEEL CORP. 55
Agency—Batten, Barton, Durstine & Osborn, Inc.

VICKERS, INC. 57
Agency—Witte & Burden Adv.
VLIER ENGINEERING, INC. 32
Agency—Patten & Associates

WHITTAKER CO., LTD., WM. R. 30
Agency—Mogge-Privett, Inc.
WILCOX ELECTRIC CO. 51
Agency—Carter Adv. Agency, Inc.
WYANDOTTE CHEMICALS CORP. 38
Agency—Brooke, Smith, French & Dorrance, Inc.

SEARCHLIGHT SECTION

(Classified Advertising)

H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant 74-77
Selling Opportunities Offered 76
Positions Wanted 76
Selling Opportunities Wanted 76
PLANES—EQUIPMENT
(Used or Surplus New)
For Sale 76-79

ENGINEERS

. . . FLIGHT TEST

. . . ANALYSIS

. . . AIRCRAFT STRUCTURES

WILL CONSIDER RECENT GRADUATES

IN AERONAUTICAL, ELECTRICAL OR MECHANICAL ENGINEERING

Salaries & Responsibilities Commensurate With Exp.

Opportunity for professional advancement in expanding flight research organization primarily engaged in development, installation and flight test of aircraft instrumentation and flight control equipment. Structural design and stress analyses experience desirable.

Positions involve all phases of flight test including preliminary study work, planning of tests, installation of equipment, and analyses of results.

CENTRAL LONG ISLAND LOCATION AT MacARTHUR AIRPORT IN RONKONKOMA, N. Y.

Submit Resume to

Box 218, Ronkonkoma, N. Y.
or Phone RONKONKOMA 9-8086

For Interview Appointment or Apply in person Flight research dept.

SPERRY

GYROSCOPE COMPANY
MacARTHUR FIELD,
RONKONKOMA, N. Y.

STAINLESS STEEL FASTENINGS OF ALL TYPES

RIGHT OFF THE SHELF

• Sheet Metal Screws • Machine Screws • Cap Screws • Set Screws • Wood Screws • Nuts, Washers, etc. • Class 3 AN Drilled Fillister Heads • Titanium Bolts Now Available: Inquiries Invited. PROMPT DELIVERIES ON SMALL OR LARGE QUANTITIES. Fast service on special screw machine products. Write for complete descriptive catalog.

Star STAINLESS SCREW CO.

ARmory 4-1240

234 Union Ave. • Paterson 2, N. J.

Direct NEW YORK telephone: Wisconsin 7-9041

Engineers

Join the Sabre Builders

Insure your future with North American Aviation. The Engineering Department has challenging openings for engineers with aircraft experience, for recent grads . . . for men from other fields with adaptable experience. Twenty-five years of engineering vision and expansion and long term military projects secure your future. Openings now in:

THERMODYNAMICS • AERODYNAMICS
SYSTEM ANALYSIS • STRUCTURES
SERVO-MECHANISMS • ELECTRONICS
SPECIALISTS IN ALL MAJOR AIRCRAFT FIELDS

Liberal travel and moving allowances

Write to

North American Aviation, Inc.

Section 10
Engineering Personnel Office
Los Angeles International Airport
Los Angeles 45, California
or
Columbus 16, Ohio

NORTH AMERICAN HAS BUILT MORE AIRPLANES THAN ANY OTHER COMPANY IN THE WORLD

EDITORIAL

Incredible Effrontery; Political Censorship Is Here

It is incredible that President Eisenhower will countenance the amazing security directive that is being distributed by the Navy's Bureau of Aeronautics, as disclosed in a story elsewhere in today's AVIATION WEEK, written by William Coughlin, West Coast Editor.

There are reports that a similar policy is being prepared by the Air Force.

Among other examples of effrontery is the document's presumptuous warning that the Navy has the right, and will exercise it, to withhold "uncleared" information from the American public even if it is unclassified.

As Mr. Coughlin and a few courageous aircraft industry individuals point out, there is no better way than this to try to enforce political censorship—by withholding information on grounds other than military security.

The Administration should repudiate immediately this brazen assault of unscrupulous bureaucrats on American liberties and rights.

Thomas E. Braniff

Hardly more than 10 days after the death of Albert Plesman, KLM founder and president, the air transport world read of the death of Thomas E. Braniff, another of its outstanding leaders. He was killed Jan. 10 in an executive plane with nine other business executives and two pilots.

Mr. Braniff was one of the founders in 1928 of the airline named after him, and at the time of his death he was president and chairman of the board of Braniff International Airways.

Although the Braniff name was best known throughout the world in connection with air transport, Mr. Braniff already had made a name for himself in insurance by 1928. He retained this interest up to his death.

His aviation record is well known. He was also a devout Catholic and gave generously of his time in religious, charitable, civic, cultural and business groups. Since 1945 he had served as the Catholic co-chairman of the National Conference of Christians and Jews. The Christmas card which he and Mrs. Braniff mailed to their friends a few weeks ago carried a religious theme.

Besides his airline interests, he was president of the T. E. Braniff Co., and the Braniff Investment Co., and board chairman of the Prudential Fire Insurance Co. of Oklahoma.

His other charitable and civic activities included the Dallas Community Chest, University of Notre Dame Foundation, American Cancer Society, Oklahoma City University, Dallas Pilot Institute for the Deaf, the Institute of International Education, the Institute of Fiscal & Political Education, the English Speaking Union of the U. S. and the Boy Scouts. In 1944 he and his wife, Bess, established the Braniff Foundation to support religious, educational and scientific interests.

Under his direction, Braniff Airways developed from an airline with a single-engine, five-place plane to one of the six largest air carriers in the United States, operating also into Latin America.

Besides being a stalwart aviation leader, he was a respected humanitarian and citizen as well.

Truth or Distortion?

Members of National Business Aircraft Assn. must have been surprised to read just the other day in the newsletter sent out by headquarters in Washington that AVIATION WEEK distorted two controversial letters written to us last October by Jean DuBuque, executive director of NBAA, and Cole Morrow, board chairman.

If any member of NBAA is tempted to believe this hogwash, we remind him that an editorial of Oct. 26 quoted generously and accurately from Mr. DuBuque's letter, and in our issue of Nov. 2, page 86, we published the complete text of the same letter, even though this meant repeating the parts we already had published.

It is difficult to distort a full text. We published this letter in full in an effort to be fair, and thus make unnecessary this very kind of cry of "distortion."

The editorial of Oct. 26 also quoted accurately from Mr. Morrow's indignant letter. There was no distortion. In fact, AVIATION WEEK's refusal to distort the news may be partly responsible for NBAA's attitude toward our reports so far on business flying.

As interested as we are in this vital field, which holds so much promise for growth, we cannot feel that it does this segment of aviation—or any other—any good to publish only "promotional" information.

We are more interested in printing the truth about aviation than in presenting only one side, merely the favorable or the unfavorable, although when the facts point undeniably to aviation's progress we are glad to shout it everywhere, including distribution of press releases to the newspapers.

But NBAA and others sometimes fail to realize that progress is based on truth and facts, not on superficial thinking, questionable statistics, dressed-up publicity, mere promotion stunts, or a glossing-over of the darker corners of the picture in favor of the rosy hues.

Progress comes only from getting down to brass tacks and facing reality, even when it isn't pleasant. Occasionally, we would remind NBAA, our best friends are those who compel us to look at our problems realistically.

Everything isn't peaches and cream in this aviation business; sometimes we think there isn't any other pursuit in life that exacts so many heartaches for each step forward. None of us in aviation can feel anything but sadness after a weekend like Jan. 8-11.

But denying that these tragedies occurred, or refusing to exert every effort to find why they happened, or failing to try to prevent recurrences isn't the way to develop aviation.

It is not distortion to print the truth about such travail, despite the cries of the promoter who is paid to paint only the rosy side of life.

—Robert H. Wood

This valve is a Spendthrift

But it needn't be! Valve clearance trouble, with resulting fuel and power waste, is easily detected by the Sperry Engine Analyzer. By using vibration analysis to check each cylinder under normal operating conditions, valve clearances can be adjusted for smoother engine performance. Result . . . engines develop full power—run cooler—use less fuel—last longer.

• Vibration analysis, exclusive with the Sperry Engine Analyzer, can be employed either in flight or on the ground. When using the Engine Analyzer, valve clearance can be easily checked at each inspection and overhaul—a profitable procedure for airlines and executive aircraft operators.

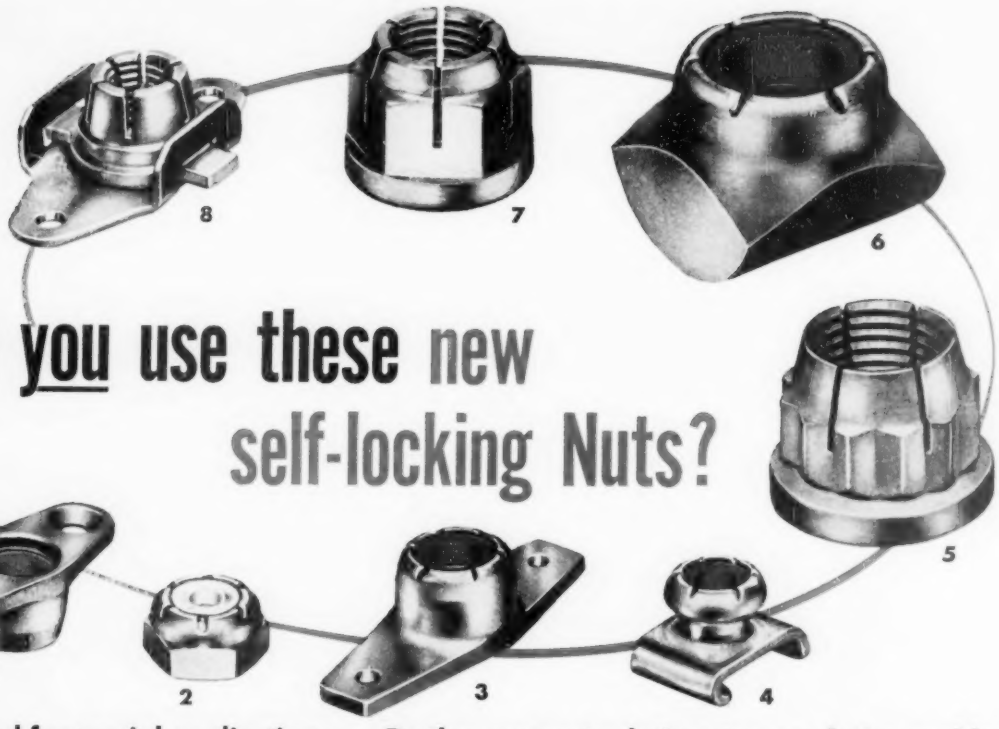
• In addition to vibration analysis, the Sperry Engine Analyzer also provides detailed ignition analysis. It immediately detects, locates and identifies irregularities in aircraft power plants—either during flight or on the ground. Aside from saving ground maintenance time, the Engine Analyzer enables the flight engineer to maintain proper operating conditions at all times and prevents unnecessary component replacements.

• Our nearest district office will give you complete data upon request.

SPERRY PORTABLE ENGINE ANALYZER

SPERRY GYROSCOPE COMPANY
DIVISION OF THE SPERRY CORPORATION

GREAT NECK, NEW YORK • CLEVELAND • NEW ORLEANS • BROOKLYN • LOS ANGELES • SEATTLE • SAN FRANCISCO
IN CANADA • SPERRY GYROSCOPE COMPANY OF CANADA, LIMITED, MONTREAL, QUEBEC



Can you use these new self-locking Nuts?

Designed for special applications . . . Do they suggest solutions to *your* design problems?

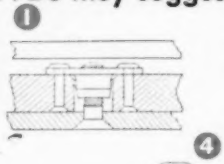
1 **TWO-LUG INVERTED ANCHOR NUT** For use where clearance or other considerations make it necessary to mount the nut upside down. Clearance hole must be provided for the barrel. Nylon inserts.

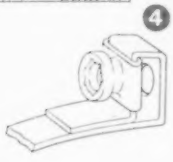
2 **LIGHT HEX NUT, KEL-F INSERT** Special KEL-F insert provides the self-locking, vibration-proof features of all ELASTIC STOP® nuts, for operation under extremely corrosive conditions—or exposed to strong acids—such as fuming nitric.

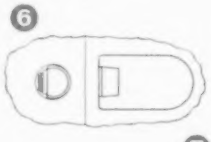
3 **TWO-LUG HIGH-TENSILE ANCHOR NUT** For use with 160,000 psi bolts, in blind mounting or in applications where ease of maintenance makes an attached nut desirable. Nylon inserts.

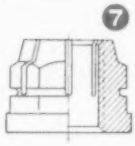
4 **SELF-LOCKING CLAMP NUT** For installation around the clamp leg, or on slotted strips where a random lengthwise positioning of the nut is necessary. Red nylon locking insert.

5 **HIGH-TEMPERATURE, CLOSE CLEARANCE DOUBLE-HEX NUT** For applications where weight, wrenching area and elevated temperatures are all major considerations. Temperatures to 1200° F.









6 **LIGHTWEIGHT BARREL NUT** Barrel nuts permit the use of lighter forgings—and simplify machining. "Bathtub" type recesses are necessary for the bolt head only, since the barrel nut fits into regular drilled hole. Wrenching is simplified because the nut cannot turn. This is a lightweight version of the ESNA high-tensile barrel nut, for 160,000 psi bolts. Nylon inserts.

7 **ACCESSORY MOUNTING NUT** High-temperature nut for mounting generators or similar accessories having a keyhole-type mounting flange. Large base diameter compensates for seating area lost to slot in flange. Nut straddles slot without Brinnelling the flange. Temperature to 550° F.

8 **HIGH-TEMPERATURE FLOATING-BASKET ANCHOR NUT** Specially designed for applications where a lesser degree of accuracy in alignment of nut and bolt hole is desirable. To 1200° F.

Mail coupon for design information

ESNA

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. N48-125, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send details on the following fasteners:

☐ 1 ☐ 3 ☐ 5 ☐ 7
☐ 2 ☐ 4 ☐ 6 ☐ 8

☐ Here is a drawing of our product. What self-locking fastener do you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____